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THE IRON TRADE REVIEW

A Weekly Journal Devoted to the Machinery, Metal-Working and Foundry Trades, and Iron and Steel Manufacture.

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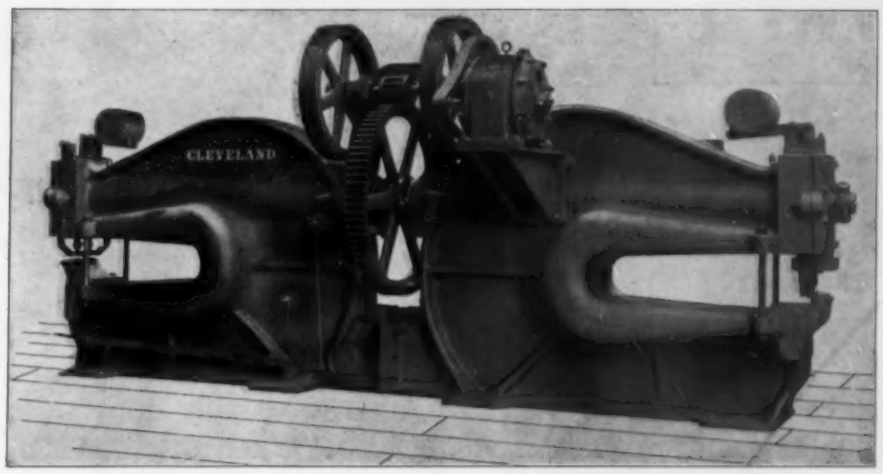

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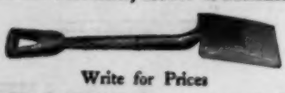

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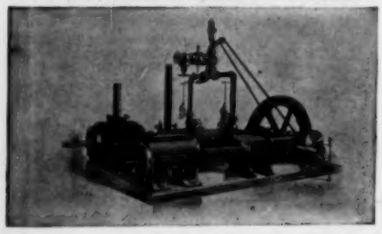

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THE IRON TRADE REVIEW

VOLUME XXXVII CLEVELAND, OHIO, SEPTEMBER 1, 1904 NUMBER 35

THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The meetings of the beam and plate pools appointed for New York on Wednesday, following the important conferences of the past ten days, put the trade in the attitude of lively expectancy. As this is written word comes that the meeting of the structural steel manufacturers has adjourned until Monday, Sept. 5, and the plate meeting is also postponed. As has been indicated in this column, the views of manufacturers differ, both as to the size of the cuts that should be made, and some even doubt the advisability of changing the basis that has been maintained under the evasions and more or less open cuts of recent months. The cooperation of the Lackawanna Steel Co. is said to be assured in the beam pool, provided the evasions that have come through low prices on fabricated material can be cured. While this company has been expected to turn out structural shapes in the coming fall, there is now some reason for doubt as to its ability to deliver material this year—a consideration that may have a bearing on the action taken at New York.

New business in the heavy forms of finished material is not expected to be of any moment while the future of prices is in doubt; but the important interests that have been working to restore confidence are reported to have uncovered a large amount of prospective business in their search for data as to their future price policy. For a year business in heavy materials has been limited, even though there have been intervals of good activity in one and another of the lighter products. In all lines stocks in jobbers' hands have been brought to low point. When the diverse interests that have bought so abstemiously for months find prices to their advantage a covering movement is possible that would be felt throughout the trade. The recent beginning of new activity in lake shipyards is accompanied by reports of further possibilities provided the desired concessions in ship plates can be secured. Whether preferential treatment shall be given the shipbuilders is still an unsettled question with the steel manufacturers.

The largest business awarded in the week is a structural contract of 11,000 tons for the Chicago Junction railroad, taken by the American Bridge Co. An independent mill in the Wheeling district took at a surprisingly low price 1,500 tons of casing, awarded by a West Virginia natural gas company. A B. & O. order for 1,000 steel cars was placed in the Pittsburg district, and the activity of steel car works is a great improvement over early months in the year, though as yet far from normal. The cut in wire products has resulted in some good business, consumers evidently understanding that the present level of prices is not to be depended on indefinitely. Wire rods have not been reduced greatly, but as low as $25.50 Pittsburg is reported, as against $28 before the recent billet deal.

The cut in wire freights to the West shows what may be expected now that the far Western field can be served from Colorado. Southwestern business on wire products may also show similar irregularities in view of the operations of a Southern producer.

Rail buying for 1905 is not likely to be hurried and announcements of the establishment of a price for next year by the rail pool are entirely premature. There are uncertain factors in the situation that those who have set out to fix prices for the iron trade need to find more light on.

An indication of better specifications and of fuller operation of steel works is found in the starting up of 12 Steel Corporation blast furnaces in the past 10 days. This brings into activity 3,000 additional coke ovens. The foundry iron situation is generally quieter, the lead of several important buyers who entered the market a few weeks ago not having been generally followed. The Alabama coal miners' strike drags on and promises to be further protracted. While the $9.50 basis for No. 2 iron is generally maintained, rather more business is done at $9.25. Northern foundry iron has come to a stand at prices that permit of little shrinkage, without lower priced labor and material, neither of which is likely.

The entire iron trade is in an attitude of readiness for new developments, with a more generally hopeful feeling in nearly all lines. The outcome hangs on the action of the powers regarding prices.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, Aug. 31.

Representatives of the leading steel interests continue to hold conferences in New York this week, and announcement of the result of negotiations during the past two weeks is expected today or tomorrow. There are many rumors of the action already taken at these conferences, but as yet nothing official is obtainable. It is reported that the Lackawanna Steel Co. has become a member of the beam pool and that no action will be taken with reference to the entrance of this company into the plate pool until later in the year. There are also reports that the official price of billets has been cut, but the leading steel interests deny that any such action has been taken, it being thought best to maintain the nominal $23 basis and keep the cuts as close to that level as possible.

The trade is awaiting the outcome of these meetings, and in finished lines little new business is being placed. A number of consumers of billets have been in the market during the week, offering to place contracts for billets at prices from $4 to $6 below the agreed basis. The recent reduction in wire products was not followed by a corresponding reduction in rods. While sales have been reported as low as $25.50, Pittsburg, most of the mills are asking $27. At these prices it is impossible for an independent mill not producing its own rods to compete at the low wire prices that are ruling. That rods would be reduced in proportion to the finished product was of course not expected by the trade, as the move was designed in part to remove the competition of these small finishing mills.

The reduction in freight rates on wire and nails from Chicago to Colorado common points made by the Union Pacific railroad last week and which went into effect on Monday, will be withdrawn in ten days. There is little doubt that the reduction in the tariff from 77 to 45 cents was made in the interest of the leading wire interest that had 500 cars to ship into the Colorado Fuel & Iron Co.'s territory.

That the demand for finished material is improving, at least among the subsidiary companies of the United States Steel Corporation, is indicated by the resumption of idle stacks. During the past ten days twelve furnaces that have been idle from one to two months have resumed

operation. In addition to the six noted last week the following furnaces were blown in since Monday: Mingo Junction, O., two furnaces; one Edgard Thomson, one New Castle, one Clairton and one Sharon. At Sharpsville, Pa., the Pierce furnace is preparing to resume, while the Lackawanna Steel Co. is already in the market for its two new stacks which it expects to place in operation in the next two months. The Bessemer plant of the Bellaire, O., works of the Carnegie Steel Co. resumed the latter part of last week after an idleness of nearly two months, and the steel plant at Mingo Junction is expected to resume shortly. The Shenango Bessemer plant at New Castle resumed after a week's idleness and the Bessemer department at the Homestead works is on in full this week. These furnaces will require at least 6,000 tons of coke daily and 3,000 coke ovens will have to resume operations immediately to meet this increased demand.

The strike at the plants of the American Steel Hoop department of the Carnegie Steel Co. at Girard and Youngstown continues, while the trouble at the Republic mill of the National Tube Co. in this city is at an end, the company having won the strike. Nearly all the former employes returned to work and the mill will hereafter operate on a non-union basis.

In finished lines there have been no contracts of importance placed. One order for 25 miles of casing for a West Virginia gas line went to a Wheeling mill at an extremely low price. About 1,500 tons is involved. Demand for line pipe and casing continues heavy, but shading is reported on the merchant sizes. While as low as 2c has been reported on 28-gauge sheets, most of the interests refuse to go below 2.10c. Demand for tin plate is by no means heavy. Business in plates is light outside of the requirements for an occasional order for steel cars. The Baltimore & Ohio railroad this week placed an order with the Standard Steel Car Co. for 1,000 cars, and 10,000 tons of plates will be required to fill the order. In the past two weeks there has been more activity in steel cars than for some time, but the new business continues far below normal.

Pig Iron.—The iron market continues quiet, and buying is limited almost entirely to small lots for immediate shipment. Bessemer can be had for prompt shipment at $11.85 to $11.90 furnace, while No. 2 foundry iron continues to be held at $12.60 to $12.85 Pittsburg. On forge iron $11.85 Pittsburg can be readily done, although a few furnaces are asking $12. A Westinghouse interest has out one of the largest inquiries of the week, calling for 1,000 tons of foundry iron. The order has not yet been placed. Southern foundry iron can be had on the basis of $9.25 for No. 2, and if the strike of the coal miners in the Birmingham district had not caused the shutting down of so many furnaces in that region it is believed that the iron could be had on a much lower basis today. The Southern situation is by no means strong and little buying is reported by the furnaces in blast. We revise quotations as follows:

Bessemer, Valley	$11 85 to 12 00
Bessemer, Pittsburg	12 70 to 12 85
No. 1 Foundry	13 00 to 13 25
No. 2 Foundry	12 60 to 12 85
Gray forge, Pittsburg	11 85 to 12 00
Chilled basic, Valley	11 75 to 11 80
Chilled basic, Pittsburg	12 60 to 12 65

It is reported that 7,000 to 8,000 tons of Bessemer pig iron has been sold in the past few days at $11.75 to $11.85 at Valley furnace.

Steel.—The sale of one small lot of Bessemer blooms is reported on the basis of $21 Pittsburg. Otherwise there is little buying, consumers awaiting the outcome of the New York conferences. The Carnegie Steel Co. this week has its Bellaire, Shenango and Homestead Bessemer departments on in full, and additional open hearth capacity has been added. Agreed quotations are as follows: Bessemer and openhearth billets, 4 x 4 inches, and slabs up to and including 0.25 carbon, $23 Pittsburg, Wheeling, Valley, Johnstown, Ashland, Ky., Ironton, O., and Lorain, O.; 0.26 and including 0.60 carbon $1 advance; and 0.61 to 1.00 carbon, $2 advance. Billets smaller than 3⅞ inches and sheets and tin bars are $1 per ton extra. Bessemer and open-hearth rods are quoted at $25.50 to $27.

Ferro-Manganese.—Domestic ferro, 80 percent, is held at $41 per ton, delivered at any point east of the Mississippi. This price practically shuts out all foreign competition.

Spelter.—The spelter market advanced sharply during the week, prime Western grades now being held at 5.02½c to 5.05c Pittsburg.

Muck Bar.—Muck iron is held nominally at $24 to $24.85 Pittsburg. There is little demand.

Skelp.—Demand for skelp is improving somewhat, steel grooved being held at $1.30c and sheared at 1.35c to 1.37½c. Iron grooved is quoted at 1.40c and sheared at 1.45c.

Rails and Track Material.—The rail tonnage noted last week is the heaviest in months, and according to reports will be rolled in the next two months. Competition on light rails continues keen, and 25-pound sections continue to be held on the basis of $18 Pittsburg. We make the following quotations: Standard sections, 50 pounds and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 16 to 40 pounds, $18 to $20. Track material, spikes, 1.55c to 1.60c.

Plates.—Demand for steel cars is better than for some time, the Baltimore & Ohio railroad this week having closed an order for 1,000 cars, the contract going to the Standard Steel Car Co. To fill this order 10,000 tons of plates will be required. We make the following quotations: Tank plates, ¼ inch thick, and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.70c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.85c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates, more than 10 inches, 5c extra 100 pounds. Plates 3-16 inch in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots with 5c extra a hundred pounds for less than carload lots. Terms, net cash in 30 days.

Structural Material.—Since the closing of the South Side Elevated contract for Chicago, low prices on structural material have almost entirely disappeared, indicating that the American Bridge Co. is about filled up for the next three months. Despite the strikes throughout the country among the building trades, the demand for structural material has been better during the past month than was expected, and nearly all the mills have more tonnage on their books than at any time during the summer. We quote: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles, from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

Sheets.—While as low as 2c has been reported on sheets for 28 gauge, few of the mills are willing to make this price except for very desirable business. The basis for the general run of trade continues on the basis of 2.10c. We quote: No. 8, 1.60c; No. 9, 1.56c; Nos. 12 to 14, 1.70c; Nos. 15-17, 1.75c to 1.80c; Nos. 18-21, .85c to 1.90c; Nos. 22-24, 1.95c; Nos. 25-26, 2c; No. 27, 2.05c; No. 28, 2.10c to 2.15c; No. 29, 2.35c to 2.40c; No. 30, 2.50c to 2.55c. Galvanized: Nos. 12-17, 2.20c to 2.25c; Nos. 18-21, 2.35c to 2.40c; Nos. 22-24, 2.50c to 2.55c; Nos. 25-26, 2.65c to 2.70c; No. 27, 2.90c; No. 28, 3.10c; No. 29, 3.45c to 3.50c; No. 30, 3.85c to 3.90c.

Wire and Wire Nails.—Practically none of the smaller independent mills are meeting the competition of the leading interest on wire and nails. With $27 rods and wire on the basis of $29 none of the mills that do not produce their rods can compete, and even with rods at $25.50, the price at which recent sales have been made, the spread is not great enough. We make the following quotations: Wire nails, jobbers' carload lots, $1.60; retailers' carloads, $1.65, and less than carloads, $1.75; painted barb wire, $1.75 to jobbers in carloads; retailers' carloads, $1.80, and less than carloads, $1.90, with 30 cents for galvanizing. Annealed smooth fence wire is held at

$1.45, with the usual differentials to retailers for carloads and less than carloads. Quotations are all f. o. b. Pittsburg, 60 days, with 2 percent discount for cash in ten days. Iron and steel cut nails are held at $1.65 to $1.70.

Pipes and Tubes.—The Wheeling Steel & Iron Co. has received an order for 25 miles of 7-inch o. d. pipe for a West Virginia gas line. The price at which the business was taken was very low, the competition having been keen. On merchant sizes considerable shading has been reported. Discounts to consumers, carload lots f. o.b. Pittsburg, plus freight to destination according to Tube Rate Book, are as follows:

MERCHANT PIPE.

	Steel.		Iron.	
	Black.	Galv.	Black.	Galv.
⅛, ¼ and ⅜ inch	70	55	69	54
½ inch	73	63	72	62
¼ to 3 inches	78½	68½	77½	67½
3½ to 6 inches	77	67	76	66
7 to 12 inches	72½	57	71½	56
Extra strong plain ends, ⅛ to 8 inches	69	59	68	58
Double extra strong, ½ to 8 inches	60	50	56	46

MERCHANT BOILER TUBES, LESS CARLOADS, 22 FEET AND UNDER.

	Steel.	Iron.
1 to 1½ inch	48	43
1⅝ to 2¼ inches	60	43
2½ inches	62	48
2¾ to 5 inches	68	55
6 to 13 inches	60	43

Merchant Steel.—Demand is improving in almost all lines, but it is still far below normal. We make the following quotations: Toe calk, 1.90c; carriage spring steel, 1.75c; tire steel, 1.55c to 1.60c; plow steel, 6 inches and under, 1.35c for Bessemer and open hearth; plow slabs, ¼ inch and heavier, 1.60c. Drawn and cold rolled shafting is held at 52 percent off in carload lots and 47 off in less than carload lots.

Bars.—The iron and steel bar market continues quiet, although no shading of steel bars is reported in this market. Iron bars are held on the basis of 1.25c Pittsburg, although one of the largest producers refuses to shade 1.30c. We make the following quotations: Bar iron, 1.25c to 1.30c Pittsburg for local delivery, while for Western shipments quotations are based on 1.25c to 1.35c Pittsburg. Hoops are held at 1.55c base, and bands at 1.35c taking bar extras. Bessemer steel bars, 1.35c; open hearth, 1.40c; plow beams and cultivator beams, 1.35c net; channels, angles, zees and tees, Bessemer, under 3 inches, 1.45c. The following differentials are maintained on steel: Less than 2,000 pounds of a size, not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance.

Old Material.—Demand for old material continues light and the market is by no means firm. Dealers who loaded up on all grades of material some time ago are all holding for higher prices, but consumers are not willing to buy at their quotations. We make the following quotations, gross tons: Heavy melting stock, $11.50 to $12; rerolling rails, $12 to $12.50; remelting rails, $11.50 to $12; low phosphorus melting stock, $15 to $15.50; sheet scrap, $9 to $9.50; No. 1 wrought, $12 to $12.50; cast iron borings, $6 to $6.50; No. 1 cast, $10 to $10.50.

Coke.—The resumption of thirteen idle stacks, one independent and twelve of the Steel Corporation will necessitate the firing of 3,000 idle ovens. About 10,700 ovens are idle at present in the upper and lower Connellsville districts, but before the end of the week it is expected that this number will be reduced to below 8,000. Furnace coke is somewhat firmer and Connellsville is held on the basis of $1.40 for delivery the remainder of the year. Foundry coke continues to be held at $1.85 to $2, although a few grades command somewhat higher prices. During the week ending Aug. 20 the production of the upper region amounted to 158,481 tons and the lower region to 65,060 tons.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, Aug. 31.

The local iron and steel market is emerging from the turmoil incident to the wide publication two weeks ago of the reports regarding the disruption of pool agreements. A healthier sentiment prevails everywhere, and now that the storm has been weathered successfully, it is believed the demand will be freer and prices steadier. Some hesitancy still exists in the matter of ordering for future requirements, the disposition being to buy only for current needs and to cut these down as low as possible. This is the natural outcome of the experience through which the trade has gone, and it will undoubtedly be some weeks before customers are thoroughly reassured there will be no changes such as have been reported and are again buying with any degree of freedom. Some small lots of rails have been placed in the past week, but nothing approaching the tonnage of ten days ago. It is said that European mills are actively competing with domestic producers for seaboard business, the former quoting close to $28 per ton on standard sections, f. o. b. dock, duty paid. Billets are quiet, and selling $2 to $3 a ton below association prices. Some small contracts for structural steel have been taken and a few orders for plates were also placed with leading mills, but the tonnage is of small proportions. Wire rods are weaker, and are quoted $27.50 to $28 Chicago. Implement manufacturers are specifying freely against contracts for steel bars and a fair amount of new business is also being placed. Iron bars are strong at 1.35c Chicago, though demand is only moderate. A brisk business is being done in wire nails and kindred products, nearly all of which is for immediate shipment.

Pig iron is without material change, Southern No. 2 selling at $13.15 Chicago, and Northern grades at $13.25 for No. 2. Some demand has come to the front for malleable iron, including one inquiry for 12,000 to 15,000 tons. Coke is firm, the Connellsville product selling at a minimum of $2 at the ovens for foundry grades. Old material has an advancing tendency and several products are selling from 25 to 50 cents higher than a week ago. There is a brisk demand for cast iron scrap, both heavy and light, which is noticeably scarce.

Pig Iron.—In spite of the apathy that marks the attitude of melters towards the local market, pig iron is stronger than it has been since prices reached their present level. Sellers do not believe that the market will suffer from the uncertainty that has prevailed in finished materials, beyond making buyers a little more cautious. This is already evidenced in the week's sales, all of which were for small lots. The edge of the recent buying movement was taken off before the scare set in, and sellers say it is not unnatural that transactions should show a falling off at the present time. The melt of iron, however, has increased, and though the new tonnage may continue of moderate proportions, all furnaces expect a heavy demand against old contracts. One local selling interest reports that its yard stock has been depleted in the past month over 6,000 tons, in addition to selling its daily output, which is evidence of the improvement in the general situation. A Southern interest that has been sacrificing its differential of 25 cents a ton and quoting No. 2 iron on the basis of $9.25 Birmingham has withdrawn this price and is now selling at $9.50. The same company is also asking 25 cents a ton higher for iron sold on analysis than on fracture. There is a fair demand for Northern irons, sales of which are made from $31.25 to $13.50 Chicago for No. 2. Some demand has also been noted during the week for malleable iron, a large consumer asking prices on 10,000 to 15,000 tons. We have revised some of our prices and quote as follows:

Lake Superior Charcoal	$14 75 to 15 00
Northern Coke Foundry No. 1	13 75 to 14 00
Northern Coke Foundry No. 2	13 25 to 13 50
Northern Coke Foundry No. 3	12 75 to 13 00
Northern Scotch Foundry	14 50 to 15 00
Ohio Strong Softeners No. 1	14 50 to 15 00
Ohio Strong Softeners No. 2	14 00 to 14 50
Southern Coke Foundry No. 1	13 65
Southern Coke Foundry No. 2	13 15
Southern Coke Foundry No. 3	12 90
Southern Coke Foundry No. 4	12 65
Southern No. 1 Soft	13 65
Southern No. 2 Soft	13 15
Southern Gray Forge	12 40 to 12 65
Southern Mottled	12 15 to 12 40
Southern Silveries (4% to 6% Silicon)	14 85 to 15 85
Jackson Co. Silveries (8% to 10% Silicon)	17 80 to 18 30
Alabama and Georgia Car Wheel	18 85 to 19 35
Malleable Bessemer	13 50 to 13 75
Alabama Basic	13 15 to 13 40

Billets.—The local trade is dull and featureless. Association prices are being shaded $2 a ton in the quotations made on the business being offered. With this reservation, we continue to quote the "official" schedule, as follows: Bessemer and open-hearth billets, 4 x 4 and larger, up to .25 carbon, $25; up to and including .60 carbon, $2 extra. Billets, 3¾

inches and smaller, and sheet and tin bars, $25. Wire rods, $27.50 to $28.

Bars.—Demand for steel bars has not been as active in the past week as in the preceding week, though specifications keep up to good sized proportions. Some new business has been placed with mills by concerns whose requirements have exceeded their contract amounts. Prices are unchanged at the quotations given below. Iron bars are firm at 1.35c Chicago, and though individual orders are not of large tonnage, the aggregate volume of sales compares favorably with that of recent weeks. We quote on carload lots, mill shipments, Chicago delivery, as follows: Bar iron, 1.35c; soft steel bars, 1.40c to 1.51½c; soft steel angles, less than 3 x 3, 1.61½c; hoops, 1.71½c. On lots from store, we quote bar iron, 1.75c base, full extras; steel bars, 1.70c to 1.80c base, half extras; hoops, 2.10c rates, full extras.

Sheets.—Business is plentiful and prices are holding up well. Reports say that the following quotations are being shaded, though these cannot be traced to any mill. We continue to quote one pass, cold rolled, blue annealed sheets, mill shipments, Chicago delivery, as follows: Nos. 9 and 10, 1.77½c to 1.79½c; Nos. 11 and 12, 1.79½c to 1.86½c; Nos. 13 and 14, 1.86½c to 1.91½c; Nos. 15 and 16, 1.89½c to 2.01½c. On box annealed, one pass, cold rolled: Nos. 18 and 20, 2.01c to 2.06½c; Nos. 22 and 24, 2.06½c to 2:11½c; Nos. 25 and 26, 2.11½c to 2.16½c; No. 27, 2.16½c to 2.21½c; No. 28, 2.26½c to 2.31½c; No. 29, 2.41½c to 2.46½c; No. 30, 2.51½c to 2.56½c. Jobbers report a fair demand for both black and galvanized sheets from stock. Prices are without change, and we quote as follows: No. 10 and heavier, 2c to 2.10c; No. 12, 2.05c to 2.15c; No. 14, 2.10c to 2.20c; No. 16, 2.20c to 2.30c; No. 18, 2.30c to 2.40c; No. 20, 2.30c to 2.40c; No. 22, 2.35c to 2.45c; No. 24, 2.40c to 2.50c; No. 26, 2.50c to 2.60c; No. 27, 2.60c to 2.70c; No. 28, 2.70c to 2.80c; No. 29, 2.85c to 2.95c. Galvanized sheets are quiet, and we quote Pittsburg discounts, f. o. b. mill, 80 and 5 to 80 and 10. For shipments from local store, 75, 10 and 5 to 80 percent.

Structural Steel.—The assurances from the conference held in New York recently by the leading structural steel makers that there would be no change in the present pool level has steadied the market, though it has not stopped concessions. New business has been limited to small lots, though there are several large contracts pending. We continue to quote prices on carload lots, Chicago delivery, mill shipments, as follows: Beams and channels, 16 inches and under, 1.76½c; 18 inches and over, 1.86½c; universal plates, 1.76½c; angles, 3 x 3 and larger, 1.81½c; zees, 1.76½c. On lots from store, we quote beams, channels and angles, 3 x 3 and larger, 2c; beams, 18, 20 and 24-inch, 10c extra; tees, 2.05c rates.

Plates.—Generally speaking, the market is quiet. Jobbers reports a fair number of small orders, which is about the only activity felt in this section for this product. Prices are without change, and we quote carload lots, mill shipments, Chicago delivery, as follows: Tank steel, ¼-inch and heavier, 1.76½c; flange steel, 1.86¼c; marine, 1.90½c; universal mill plate, 1.76½c to 1.81½c; 3-16-inch, 1.86½c; Nos. 7 and 8, 1.91½c; No. 9, 2.10½c; No. 10, 1.91½c; No. 11, 1.96½c; No. 12, 2.01½c. From store, we quote tank steel ¼-inch and heavier, 2c; 3-16, 2.10c; No. 8, 2.15c; No. 10, 2.15c; flange steel, 2.25c, all f. o. b. warehouse.

Rails and Track Supplies.—Several orders for standard sections have been placed with mills for lots ranging from 5,000 tons down, most of which called for delivery this year. It is said that European mills are offering rails at about $28 f. o. b. seaboard, duty paid, though it is not reported that any orders have been placed abroad. Light rails are in fair demand, and track supplies are active. We quote heavy sections, mill shipments, as follows: 500 tons and over, $28; less than 500 tons to carload lots, $30; less than carload lots, $32; second quality rails, $27; light rails, $22 to $24; track supplies, f. o. b. Joliet mill, angle bars, 1.35c; spikes, first quality, 1.65c to 1.75c; track bolts, 3½ x ⅜, with square nuts, 2.20c to 2.30c per 100 lb.; with hexagon nuts, 2.35c to 2.45c.

Merchant Pipe.—Jobbers are specifying in moderation, the many sensational reports that have been in circulation of late having disturbed the trade. A good demand is expected this fall, however. Prices are firm and without change. We quote carload lots, mill shipments, random lengths, f. o. b. Chicago, as follows:

MERCHANT PIPE.

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ to ⅜ inch	68.35	53.35	67.35	52.35
½ inch	71.35	61.35	70.35	60.35
¾ to 3 inches	76.85	66.85	75.85	65.85
3½ to 6 inches	75.35	65.35	74.35	64.35
7 to 12 inches	70.85	55.35	69.85	54.35

Boiler Tubes.—Orders have been received in the past week for fair tonnages, and the indications are that the trade is on the eve of a marked improvement. We quote carload lots, mill shipments, Chicago delivery, as follows:

BOILER TUBES.

	L. W. Steel. Percent.	C. C. Iron. Percent.	Seamless Steel. Percent.
1 to 1½ inch	46.35	41.35	52.35
1¾ to 2¼ inch	58.35	41.35	40.35
2½ inch	60.35	46.35	43.35
2¾ inch to 5 inch	66.35	53.35	} Up to 4 inches.
6 to 13 inch	58.35	41.35	} 50.85

The following are the agreed discounts from store, Chicago:

	Steel.	Iron.	Seamless Steel.
1 to 1½ inches	42½	37½	40
1¾ to 2½ inches	52½	35	37½
2½ inches	55	37½	40
2¾ to 5 inches	62½	47½	47½
6 inches and larger	52½	35	..

Merchant Steel.—Some new business has been placed with mills, though transactions of this kind are growing scarcer, the season for contracting being nearly past. Specifications are ample and all mills are running to their full capacity. We quote carload lots, mill shipments, Chicago delivery, as follows: Spring steel, 1.90c; sleigh shoe, flat sizes, 1.56½c; concave and convex, 1.76½c; cutter shoe, 2.25c; smooth finished machinery steel, 1.76½c base; smooth finished tire, 1.71½c; plow steel, 2.20c and upward according to quality; toe calk, 2.06½c base. Ordinary grades of crucible tool steel, 6½c to 8c; special tool steel, 12c up. Cold rolled shafting, 52 percent from list in carload lots, and 47 percent discount in less than carload lots.

Cast Iron Pipe.—Transactions are limited to the routine of small orders. Prices are firm and without change, and we quote 4-inch water pipe, $25.50; 6-inch to 12-inch, $24.50; larger sizes, $24; gas pipe, $1 a ton higher.

Wire Products.—Demand for all wire products continues very brisk, jobbers covering for their fall needs in a gratifying manner. The specifications have been very heavy since the cut in prices, mills insisting on prompt shipment of material taken on this basis. We quote carload lots to jobbers, mill shipments, Chicago delivery, as follows: Wire nails, 1.75; painted barbed wire, 1.90c; galvanized barbed wire, 2.20c; smooth annealed wire, 1.60c; smooth galvanized wire, 1.90c; polished staples, 1.85c; galvanized staples, 2.15c. Less than carload lots to jobbers are five cents higher than above prices. The retail trade is quoted five cents extra than the foregoing on carload lots, and 10 cents extra on less than carload lots. Bale ties are unchanged at 82½ and 5 percent discount f. o. b. Waukegan, Ill., on straight carload lots: Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet or DeKalb, with actual freight allowed not exceeding 50 cents per 100 pounds. A very brisk demand for all wire materials has followed the announcement of this reduction, though mills are insisting on prompt shipment of all orders taken at the new prices.

Foundry Coke.—Demand continues fair and prices are strong. The scarcity of high grade Connellsville coke that existed two weeks ago has disappeared, the daily shipments now being able to take care of current needs. Standard 72-hour Connellsville grades are firm at $2 to $2.10 at the ovens, while the various Southern grades are selling from $1.75 to $2 at the ovens.

Old Material.—Scrap shows no material change from the condition reported a week ago. Prices are soaring upwards despite the lull in demand, and we note advances this week in old steel rails, No. 1 and No. 2 railroad wrought, dealers' forge No. 1, wrought pipe and flues, iron axle turnings, railroad and agricultural malleable, stove and light cast. There is a marked scarcity of cast scrap, and dealers are unable to satisfy the demand for it. Railroads are not offering much material of late, the only list now out being one from

the Chicago, Milwaukee & St. Paul railway, for 2,000 tons. We have revised our prices, and quote dealers' selling prices, as follows:

Old iron rails	$15 00 to 16 00
Old steel rails (4 feet and over)	11 50 to 12 00
Old steel rails (less than 4 feet)	10 00 to 10 50
Relaying rails, subject to inspection	21 50 to 22 50
Relaying rails for sidetracks	18 00 to 20 00
Old wheels	11 00 to 12 00
Heavy melting steel	9 50 to 10 00
Mixed country steel	7 00 to 7 50

The following quotations are for net tons:

Low phosphorus scrap (.04 and under)	$12 00 to 13 00
No. 1 R. R. wrought	11 50 to 12 00
No. 2 R. R. wrought	10 50 to 11 00
Shafting	12 50 to 13 00
Dealers' Forge, No. 1	9 00 to 10 00
Wrought pipe and flues	7 75 to 8 25
No. 1 cast, 150 lb. and less	9 50 to 10 00
Heavy cast	8 00 to 8 25
No. 1 mill	6 00 to 6 50
Country sheet	5 00 to 5 50
No. 1 boilers, cut	7 50 to 8 00
Boiler punchings	9 00 to 9 50
Iron car axles	15 00 to 16 00
Steel car axles	13 50 to 14 00
Iron axle turnings	7 50 to 8 00
Steel axle turnings	7 00 to 7 50
Cast borings	4 00 to 4 50
Mixed borings, etc	4 00 to 4 50
Wrought turnings	7 00 to 7 50
Machine shop turnings	7 00 to 7 50
Railroad malleable	8 50 to 9 00
Agricultural malleable	8 25 to 8 75
Stove plate and light cast scrap	8 25 to 8 75
Old iron splice bars	13 00 to 13 50

CLEVELAND.

OFFICE OF *The Iron Trade Review*, 1064 ROSE BUILDING, Aug. 31.

Iron Ore.—Sales have continued in moderate amounts. Some furnace owners whose plants have been idle several months, during which time sales have very slowly reduced stocks, are in doubt concerning what their requirements will be and are disposed to postpone until the latest possible time the contracting for ore. Prices as quoted by different sellers show considerable irregularity. Non-Bessemer Mesabis sell as high as $2.50, but some are available as low as $2.35, while old range non-Bessemers command 25 to 50 cents more. Some old range Bessemers are held at the $3.25 base, but this is frequently shaded to $3. Mesabi Bessemers sell at from $2.75 to $3.

The freight rate from Marquette has been reduced from 60 to 55 cents within a few days, the rates from the head of the lakes and Escanaba remaining at 65 and 50 cents respectively. Vessels are more numerous than cargoes and business from the standpoint of a vessel owner is very unsatisfactory.

Pig Iron.—Business is very dull, but prices show little change. For No. 2 foundry, $12 at the Valley stacks continues to be the usual price, but $11.75 can still be done. Local furnaces sell at $12.25 to $12.50 at their plants for Cleveland delivery. The call of foundries for delivery ot Southern iron on old contracts continues, often accompanied by reports of improved demand for castings. The Southern prices are firm at $9.25 to $9.50 Birmingham for No. 2. We quote as follows for Cleveland delivery:

Bessemer	$12 60 to 12 75
No. 1 Strong Foundry	12 85 to 13 00
No. 2 Strong Foundry	12 60 to 12 85
No. 3 Foundry	12 25 to 12 50
No. 2 Southern	13 10 to 13 35
Gray Forge	11 85 to 12 00
Gray Forge, Southern	12 00 to 12 15
Lake Superior charcoal	14 50 to 15 00

Finished Material.—After the storm caused by the discussion of the recent conversion deal, there has come a dead calm, but it is believed by many to be ominous of further reductions, and the natural result is that mills are receiving few orders, but specifications against old contracts are coming in freely. Jobbers are enjoying very fair trade, as buyers are placing orders for small quantities from stock instead of going to the manufacturers. Steel bars at 1.44½c Cleveland for Bessemer and 1.49¼c for open hearth depend more upon contracts than upon new business. Bar iron is in small demand at about 1.25c at the mill. Large quantities of sheets are being used and the difference between the official quotations of the principal producers and those of other mills is not as large as it has been. The prices of the principal producers through jobbers are as follows, Cleveland delivery, the freight from Pittsburg being 9½ cents. Mill sales of black sheets in carload lots, No. 10, 1.64½c; No. 11-12, 1.69½c; No. 14, 1.79½c; No. 16, 1.89½c; No. 27, 2.14½c; No. 28, 2.24½c. Galvanized, mill sales, No. 14, 2.24¼c; No. 16, 2.34½c; No. 18-20, 2.49½c; No. 22-24, 2.64½c; No. 25-26, 2.84½c; No. 27, 3.04½c; No. 28, 3.24½c. Out of stock, black sheets: ¼-inch, 1.90c; 3-16-inch, 2c. Blue annealed: No. 10, 2.05c; No. 12, 2.10c; No. 14, 2.15c; No. 16, 2.25c. One pass cold rolled: No. 18-20, 2.35c; No. 22-24, 2.40c; No. 26, 2.45c; No. 27, 2.50c; No. 28, 2.60c; No. 30, 3c. Galvanized out of stock: No. 16, 2.60c; No. 18-20, 2.70c; No. 22-24, 2.85c; No. 26, 3.05c; No. 27, 3.25c; No. 28, 3.45c; No. 30, 4.25c.

The material for the Anchor line passenger and freight steamers recently ordered will be furnished by the Cambria Steel Co. About 2,000 tons of plates and shapes will be required. The contract for 3,000 tons for the Tomlinson freighter is still pending, but will probably go to Pittsburg.

Old Material.—The market is more quiet. Although railroad offerings have elicited some rather high bids from dealers, consumers' ideas of prices are lower than those of dealers, who are still buying to speculate. Prices to consumers have not changed. We quote as follows for Cleveland delivery:

Old iron rails	$15 00 to 15 50
Old steel rails (over 6 feet)	12 00 to 13 00
Old steel rails (under 6 feet)	11 00 to 12 00
Old car wheels	10 00 to 11 00
Steel boiler plate	9 00 to 10 00
Malleable iron (railroad)	10 00 to 10 50
Malleable iron (agricultural)	8 00 to 9 00
Heavy steel	10 00 to 11 00

We quote as follows, net tons:

No. 1 R. R. wrought	$10 00 to 11 00
No. 1 busheling	9 50 to 10 00
No. 1 machine cast	9 50 to 10 50
Iron axles	16 00 to 16 50
Axle turnings	7 00 to 8 00
Wrought turnings (free from cast)	6 00 to 6 50
Grate bars	7 00 to 8 00
Pipes and flues	8 00 to 8 50
Tank iron	7 50 to 8 00
Hoop and band iron	5 00 to 5 50
Sheet iron	4 00 to 5 00
Wrought drillings	6 00 to 6 50
Stove plate	8 00 to 9 00
Steel axles	13 00 to 14 00
Cast borings	3 50 to 4 00

The Field-Evans Iron Co. will close its Cleveland office on Sept. 1. William Wieman, who has had charge of the office, will remain with the company and look after the trade in the same territory as heretofore, but will make his headquarters at the general offices of the company at Cincinnati.

CINCINNATI.

August 31.

The coke market is more active and a shade firmer. The supply of furnace coke in the Virginia fields upon which the Birmingham furnaces have been drawing during the strike is said to be now reduced to so small an available quantity as to embarrass the ovens in filling their contracts. In foundry coke the market is stronger in tone and the lowest quotation now openly made is $1.85 f. o. b. Connellsville, while some brands are quoted at $2.15 at ovens.

Pig Iron.—The past week has been a quiet one in the iron trade and the volume of business has been if anything slightly smaller than in the preceding week. The inquiry for iron is also light and no large tonnage is pending. Some silvery iron has been sold in Michigan territory for extended deliveries, the tonnage amounting to about 2,500 tons. There are two car wheel makers in the market, both concerns asking for quotations on foundry irons and one wanting some car wheel iron. These inquiries make an aggregate tonnage of about 3,500 tons. There is also an inquiry for 1,500 tons of basic iron. A few sales of 400 to 500 tons have been reported. The bulk of the business has been confined to lots from a carload up to 100 tons. The situation as to prices shows no change. In the Southern furnace districts quotations are mainly on the basis of $9.50 Birmingham and Northern makers are generally asking $12 for No. 2 foundry at furnace. An occasional quotation of $11.50 is heard from some of the furnaces, but this figure is decidedly the exception to the rule. Buyers are either not needing iron or are holding off. There is a disposition on the part of buyers to negotiate for pig iron when furnaces show a willingness to book orders for next year delivery, but the latter do not care

to sell, except in a few instances, beyond the balance of the year 1904. In spite of the comparative dullness in the trade there is free expression of hopefulness, and there seems to be expectation that a turn in the iron market and for the better is not far off. This sentiment is so uniform that it is worthy of comment. We quote in carload lots f. o. b. Cincinnati:

Southern Foundry No. 1	$12 50 to 12 75
Southern Foundry No. 2	12 00 to 12 25
Southern Foundry No. 3	11 50 to 12 00
Southern Foundry No. 4	11 00 to 11 25
Southern Foundry No. 1 soft	12 50 to 12 75
Southern Foundry No. 2 soft	12 00 to 12 25
Gray Forge	11 00 to 11 25
Northern Foundry No. 1	13 15 to 13 65
Northern Foundry No. 2	12 65 to 13 15
Southern car wheel iron	16 25 to 16 50

One of the largest producers of foundry iron in the South which has been out of the market for some time is again inviting business, which means that owing to the freight rate differential that is enjoyed by one of the furnaces of this company No. 2 foundry is available at $9.25 Birmingham in territory north of the Ohio river.

Finished Material.—There is no particular change to note in the market. Orders are still for conservative quantities of all materials. Jobbers in structural shapes note more demand for odds and ends to finish out work, but aside from this, trade is in about the same condition as for the past two weeks. The reports of traveling men are to the effect that while orders are small there is a hopeful feeling and trade sentiment is confident that improved demand may be looked for later on. Bar iron is still quoted at 1.35c; steel bars at 1.48c, half extras, with dealers quoting 1.60c to 1.75c for iron and steel out of store. Galvanized sheets are at 75 and 10 to 75, 5 and 2½ percent off. We quote black sheets, No. 27, at 2.25c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 2.60c; No. 27, 2.50c; No. 16, 2.30c; No. 14, 2.20c; No. 12, 2.10c; No. 10, 2.05c. Tank plates are dull and sell out of store at 2c for ¼-inch, 3-16-inch, No. 8 and No. 10. Beams and channels are quoted at 2c from stock and angles at 1.90c to 2c for base sizes.

In merchant pipe there is an effort being made to strengthen prices and hold closer to schedules than has been done in the recent past. Trade is rather quiet, but demand is not decreasing. Car load lots are quoted as follows, f. o. b. Cincinnati:

MERCHANT PIPE.

(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛, ¼, ⅜ inch	68.7	53.7	67.7	52.7
½ inch	71.7	61.7	70.7	60.7
¾ to 3 inch, inclusive	77.2	67.2	76.2	66.2
3½ to 6 inch, inclusive	75.7	65.7	74.7	64.7
7 to 12 inch, inclusive	71.2	55.7	70.2	54.7

BOILER TUBES.

	Steel Percent.	Iron Percent.
to 1½ inch	41.2	37.7
1¾ to 2¼ inch	54.2	36.7
2½ inch	56.7	41.7
2¾ to 5 inch	63.2	49.2
6 to 13 inch	54.2	36.7

Old Material.—There is not much demand and the advance in No. 1 railroad wrought has about disappeared and the market is quoted slightly lower again. Practically nothing doing in the other lines and prices are largely nominal. We quote:

Old No. 1 railroad wrought, net tons	$11 00 to 11 50
Cast machine and foundry, net tons	9 50 to 10 00
Old iron rails, gross tons	12 50 to 13 00
Old steel rails, gross tons	9 50 to 10 00
Old short lengths, gross tons	10 00 to 10 50
Old iron axles, net tons	13 50 to 14 00
Stove plate, net tons	6 00 to 6 50
Wrought turnings, net tons	6 00 to 6 50
Cast borings, net tons	3 00 to 3 50

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., Aug. 31.

Pig Iron.—The market in the past week has shown a slight increase in the volume of trade, but prices remained unchanged. Northern irons made up the major portion of the sales, two lots of 1,000 tons each being among the orders booked. Southern irons were in a little better demand also, the largest sale being of 1,000 tons. Southern makers were averse to making sales for extended shipment, believing that as the year draws to a close the market will show increased demand and higher prices. As a result all sales of Southern irons nowadays are either for immediate shipment or for a period rarely extending beyond thirty days. Southern No. 2 foundry remains firm at $9.50 Birmingham. There is a better feeling, but no improvement of any consequence is expected in the market during the coming month. New York quotations follow: Northern No. 1 X, $14.50 to $15; No. 2 X, $14 to $14.50; No. 2 plain, $13.50 to $14; Southern No. 1 foundry, $13.50 to $13.75; No. 2 foundry, $13 to $13.25; No. 3 foundry, $12.5 oto $12.75; No. 4 foundry, $12 to $12.25.

Finished Iron and Steel.—General conditions underwent no change during the week. The only large contract for structural shapes placed was one for 11,000 tons for the Chicago Junction railroad. It was taken by the American Bridge Co. Small business did not amount to much in the aggregate. Many specifications calling for structural material have either been withdrawn entirely or deferred pending definite information in relation to the future policy of the beam pool. Meetings of both the beam and plate pools will be held tomorrow. There is authority for the statement that the Lackawanna Steel Co. is willing to join the beam pool, providing the United States Steel Corporation maintains prices on fabricated steel, as well as on structural material. In plates, bars and sheets, new business continues light and prices have a weak undertone. We quote as follows for New York delivery: Beams and channels, 15-inch and under, 1.75c to 1.80c; angles, 3 to 6 inches, 1.75c to 1.80c; zees, 1.75c to 1.80c; bulb angles, 2.05c to 2.25c; deck beams, 2.05c to 2.25c; sheared steel plates, tank, 1.74½c to 1.80c; flange, 1.84½c to 1.90c; firebox, ordinary, 1.94½c to 2c; refined iron and soft steel bars, 1.49½c; sheets, in carload lots New York, No. 28, black, 2.25c to 2.30c; galvanized, 3.25c to 3.30c.

Old Material.—The market during the week has been a waiting one. Asking prices continue high with very little material changing hands. We quote:

Old iron rails	$14 00 to 14 50
Old steel rails, long lengths	11 75 to 12 50
Old steel rails, short pieces	11 00 to 11 50
Relaying rails	19 00 to 20 00
Old car wheels	11 50 to 12 50
Old iron car axles	17 00 to 18 00
Old steel car axles	14 00 to 14 50
Heavy melting steel scrap	11 50 to 12 00
No. 1 railroad wrought scrap	11 50 to 12 00
Iron track scrap	10 50 to 11 00
Wrought pipe	7 75 to 8 25
Ordinary light iron	4 50 to 5 25
Cast borings	3 50 to 4 00
Wrought turnings	5 50 to 6 00
No. 1 machinery cast	9 00 to 10 00
Stove plate	7 50 to 8 25

PHILADELPHIA.

August 31.

Rumors of coming reductions in shapes and plates disturb the market and cause buyers to delay placing orders. Actual developments cannot be recorded, but are expected before the close of the week. Contracts for new buildings are being taken at such low prices as amount to a reduction on shapes, although in bookkeeping the result is brought about by charging little or nothing for fabrication and erection of the steel.

Pig Iron.—There is little activity, but prices are held with considerable firmness and there is no prospect of change at an early date. We quote as follows for Philadelphia and nearby deliveries: No. 1 X foundry, $14.75 to $15.25; No. 2 X foundry, $14.25 to $14.50; No. 2 plain foundry, $13.50 to $13.75; standard gray forge, $13 to $13.25; ordinary gray forge, $12.50 to $12.75; basic, $12.75 to $13.

Finished Material.—While awaiting the action of the members of the various pools, buyers are not placing orders except for urgent and immediate needs. Prices are stationary. We quote as follows: Beams, channels and angles, 1.72½c to 1.85c, according to specifications, and small angles, 1.50c to 1.55c. Plates, 1.73½c for one-quarter inch, with the usual advance on extras. Bars, 1.43½c to 1.50c, for either steel or refined iron.

BIRMINGHAM.

BIRMINGHAM, Ala., Aug. 29.—While pig iron quotations in Alabama are firm and the furnacemen do not appear to be willing to make any concessions to secure business, there is no improvement in the demand for the product; in fact, the

statement is made that the demand is slow right now. The production in Alabama is still considerably under the normal. The strike of the union coal miners and the sharp competition of Northern iron makers are having their effect, but with all this there are no indications of iron being sold by the Alabama manufacturers at reduced prices. No. 2 foundry iron is still being firmly held at $9.50 per ton. Sellers of $9.25 iron do not seem to be located in Birmingham.

The Sloss-Sheffield Steel & Iron Co. has blown out one of its city furnaces and has started the improvements needed thereon. The company has five furnaces now in operation. There are three or four furnaces in this district ready to resume operations on very short notice and machinery will be started quite generally just as soon as the situation in the coal section is more settled. The operators are replacing union men with non-union labor and coal production is improving daily. The Woodward Iron Co. expects to be able to start up one of its furnaces in the latter part of the week, its coal output now being quite satisfactory. One charcoal furnace is in operation, belonging to the Shelby Iron Co.

The following quotations are given for pig iron: No. 1 foundry, $10; No. 2 foundry, $9.50; No. 3 foundry, $9; No. 4 foundry, $8.50; gray forge, $8 to $8.25; No. 1 soft, $10; No. 2 soft, $9.50.

Steel production is holding up well. The plant of the Tennessee Coal, Iron & Railroad Co. at Ensley and that of the Alabama Steel & Wire Co. at Gadsden are both doing nicely, though the latter has not yet worn off its newness. There is a good demand for steel rails. Southern railroads are buying from the Ensley plant, the rails coming up to all requirements and proving satisfactory. There is no change in the rolling mill situation. The Tennessee Coal, Iron & Railroad Co. has been able to operate two departments of its Bessemer mills with non-union labor. No other effort has been made.

The cast iron pipe manufacturers have been enjoying a steady trade for many months now and the steady production continues. The product is being shipped in large lots, in fact about as rapidly as it is being made.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, NO. 150 NASSAU ST., Aug. 31.

Tin.—Under light trading coupled with heavy arrivals the market has been in a depressed condition all week. Prices show a declining tendency. Today's closing are: Spot, 26¾c to 27c; September, 26.75c to 26.95c. London's closing today for spot was £122 15s. Arrivals for the month to date amount to 4,030 tons, with 1,140 tons afloat.

Copper.—The market has been quiet and trading light. Prices remain unchanged. Today's closings follow: Lake and electrolytic, 12½c to 12¾c; casting, 12¼c to 12½c. London closed with prices easier, as follows: Spot and futures, £57 2s 6d. Exports for the month to date amount to 19,424 tons.

Lead.—Spot is firmer at 4.25c to 4.30c. St. Louis is 4.12½c to 4.15c. London is £11 3s 9d.

Spelter.—Is stronger at 4.95c to 5c for spot. St. Louis is 4.85c. London is £11 15s.

Antimony.—Both Cookson's and Hallett's are 7c asked. Other grades are 6c asked.

Quicksilver.—We quote $42 per flask of 76½ pounds in lots of 100 flasks. London is £7 15s.

Nickel.—Sales are made at 40c to 47c for large lots down to a ton, and at 50c to 60c for smaller quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, Aug. 31.

The only change to be noted in metals this week is the advance of $2 a ton in pig lead. This went into effect Aug. 29, being due largely to the increased foreign demand and decreased shipments from abroad. Other metals are without change as to price; all enjoying a fair demand and consumption on the increase. We quote as follows:

Lake copper, carloads, 13c, and for smaller lots, 13¼c; casting, 12⅝c for carloads and 13c for less than carload lots. Pig tin has declined a point, and is now quoted at 28¼c to 28¾c, according to quantity. Spelter is easy at 5c to 5¼c in carload lots; sheet zinc is without change at 6c for carload lots of 600-pound casks, and 6.25c to 6.35c for less than carload lots. Pig lead is advanced at 4.20c for 50-ton lots, 4.25c for carload lots and 4.35c for lesser quantities.

Demand for old metal is moderate, though prices are firm. We quote copper wire and heavy, 10¼c; copper bottoms, 9¼c; copper clips, 10c; red brass, 9¼c; red brass borings, 7¼c; yellow brass, heavy, 7c; yellow brass borings, 6c; light brass, 5c tea lead, 3¼c; zinc, 3.40c.

Corporation Furnaces and Steel Works Resuming.

Within the past ten days the United States Steel Corporation has blown in twelve idle blast furnaces in the Pittsburg and Valley districts. Last week the resumption of six stacks was reported, and since that time six more have gone in. At Mingo Junction, O., two of the three idle stacks are operating, the third continuing off for repairs. At Edgar Thomson, Braddock, Pa., another furnace was blown in this week, while stack No. 2 of the Clairton plant, Clairton, Pa., resumed this week. Furnace No. 3 at New Castle was also blown in, after an extended idleness, the furnace having been completely rebuilt. Furnace No. 1 at Sharon, Pa., resumed last week after relining. The other idle furnaces that have recently resumed are two at Bellaire, O., one at Edgar Thomson, one Isabella, and two Shoenberger furnaces of the American Steel & Wire Co.

The Bessemer plant of the Bellaire, O., plant also resumed late last week after an idleness of nearly two months, and the Shenango Bessemer plant, New Castle, resumed this week after a brief idleness. The converting department at the Homestead Steel Works started in full on Monday and the 84-inch plate mill at that plant, formerly known as the 119-inch mill, was also put on in full. Among independent manufacturers practically none of the idle stacks are resuming, and the general resumption of the idle steel corporation stacks indicates a good increase in tonnage both in the way of specifications and new contracts.

Furnace No. 3 of the Carnegie Steel Co., at New Castle, Pa., takes the place of the old Shenango stack at that place which was dismantled about a year ago. The new stack is 94½ x 20 feet and is equipped with four Massicks & Crooke stoves, each 85 x 20 feet. Stack No. 2 at this plant, which is to take the place of the old Neshannock furnace, is nearing completion and will be blown in shortly. It is the same size and has the same equipment as No. 3.

Earnings of British Steel Companies.

The annual report of the Guest, Keen & Nettlefolds—the $24,252,500 British iron and steel combination—covers the operations of the corporation for the year ended June 30, 1904, and shows net profits as follows: 1904, £404,023; 1903, £410,-181; 1902, £447,204; 1901, £505,259.

The annual report of Bolckow, Vaughan & Co., while reflecting the quieter trade conditions of the past year, compares favorably with the results of American companies. The net profits for the past fiscal year were £199,641, as compared with £278,748 in 1903, £183,463 in 1902 and £618,297 for a period of eighteen months preceding. Dividends of 5 percent were paid, as in the two previous years. The allowance for extensions and improvements, however, was cut to £36,522, as compared with £140,750 in 1903 and £78,421 in 1902.

The Pressed Steel Car Co., Pittsburg, is affiliated with a new car company to be organized in Canada, which will erect a plant at Montreal for the manufacture of steel cars. The new company will probably be called the Canada Car Co., and it is reported that a contract has already been entered into with the Grand Trunk railroad for its requirements for a period of five years. W. P. Coleman, formerly vice president of the American Car & Foundry Co., is one of the prime movers in the Canadian company and will become its general manager.

PRODUCTION OF FLUORSPAR IN 1903.

In his report to the United States Geological Survey, Joseph Hyde Pratt treats as follows of the domestic production and the importation of fluorspar in 1903:

The production of fluorspar in 1903 was confined to the same districts and localities in Illinois, Kentucky, Tennessee, and Arizona, whence the production of 1902 was obtained. There was a considerable falling off in the quantity of fluorspar produced in 1903 as compared with that of 1902, due partly to the depression in the iron and steel industries, and also to the stocks of fluorspar on hand that were left over from the previous year. The total production of fluorspar in 1903 was 42,523 short tons, valued at $213,617, a decrease of 5,495 tons in quantity and of $58,215 in value, as compared with the production of 48,018 short tons, valued at $271,832, in 1902.

Of the 1903 production, 30,338 tons, valued at $129,971, were sold in the form of lump fluorspar, as compared with 43,310 tons, valued at $224,832, in 1902, a decrease of 12,972 tons in quantity and of $94,861 in value; 5,235 tons of ground fluorspar, valued at $52,346, were sold in 1903, an increase of 527 tons in quantity and of $5,346 in value, as compared with 4,708 tons, valued at $47,000, sold in 1902; the remaining 6,950 tons, valued at $31,300, of the 1903 production of fluorspar were prepared for market, but not sold, being still held by the producers. This would make the total amount of lump fluorspar produced in 1903 equal to 37,288 tons, valued at $161,271. The average price per ton received for the lump fluorspar was $4.28 per ton, which is 91 cents less than the average price of $5.19 per ton received for the lump fluorspar in 1902. This prevailing low price will account to some extent for the quantity of fluorspar still held by the producers. The highest price received for the lump fluorspar was $11.50 per ton, which was for the Arizona production; the lowest price recorded was $3 per ton, which was received for a portion of both the Kentucky and the Illinois products. The two extremes in price in 1902 for lump fluorspar were $11.50 and $2.85 per ton. The lump fluorspar that is imported into the United States affects the market to some extent, especially when there is any decrease in the demand for this mineral.

The average price per ton received for ground fluorspar was $9.99, an increase of 1 cent per ton as compared with the average price of $9.98 per ton received in 1902.

The number of producers of fluorspar in 1903 was 12 as compared with 18 who reported a production in 1902. These were divided as follows: One in Arizona, 4 in Illinois, 6 in Kentucky, and 1 in Tennessee. There were 4 producers in Kentucky, 1 in Arizona, and 1 in Illinois who reported a production in 1902, but did not report any production in 1903. Kentucky was again the State to have the largest output, which was 27,499 tons of lump fluorspar, valued at $120,600, and 3,336 tons of ground fluorspar, valued at $33,360, a total production of 30,835 tons, valued at $153,960. This is an increase of 1,805 tons in quantity and of $10,550 in value as compared with the production of 29,030 tons, valued at $143,410, in 1902. This increase in value is due to the production of ground fluorspar. There was a large falling off in the production of Illinois, and also in Arizona and Tennessee the production was much less than in 1902. In the following table are given the quantity and value of the fluorspar produced in the United States in 1902 and 1903, by States:

PRODUCTION OF FLUORSPAR IN THE UNITED STATES IN 1902 AND 1903, BY STATES.

State.	1902		1903	
	Quantity	Value	Quantity	Value
	Short tons		Short tons	
Arizona and Tennessee	628	$6,872	275	$2,037
Kentucky	29,030	143,410	30 835	153,960
Illinois	18 360	121,532	11,413	57,620
Total	48,018	271,814	42 523	213,617

As appears from this table the production of Kentucky in 1902 was nearly twice as much as that of all other States, and in 1903 it was nearly three times as much. Besides the 12 producers of fluorspar mentioned above, there were 4 companies in Kentucky and 1 in Illinois which were developing fluorspar properties in 1903, and expect to be producers of this mineral in 1904.

The annual production of fluorspar in the United States since 1882 is given in the following table:

PRODUCTION OF FLUORSPAR IN THE UNITED STATES, 1882-1903, inclusive.

Year	Quantity	Value	Year	Quantity	Value
	Short tons			Short tons	
1882	4,000	$20 000	1893	12,400	$84 000
1883	4,000	20 000	1894	7,500	47 500
1884	4,000	20 000	1895	4,000	24 000
1885	5,000	22 500	1896	6,500	52 000
1886	5,000	22 000	1897	5,062	37 159
1887	5,000	20 000	1898	7,675	65 050
1888	6,000	30 000	1899	15,900	96 650
1889	9,500	45 835	1900	18 450	94 500
1890	8,250	55 328	1901	19,586	113 803
1891	10,044	78 330	1902	48,018	271 832
1892	12,250	89 000	1903	42.523	213 617

As is shown by this table, the production of 1903, although 5,495 tons less than that of 1902, is more than twice that of 1900 or 1901 and nearly three times that of 1899. This illustrates the decided advance that is being made in the use of this mineral, especially for metallurgical purposes.

As there are no separate statements regarding the amount of fluorspar in the records of the Bureau of Statistics, it cannot be stated how much of this mineral is imported and enters into competition with the domestic product. During the last year its competition has been felt to some considerable extent, and as far as can be judged the importation was greater in 1903 than in 1902.

There is a certain amount of calcium fluoride produced as a by-product in the reduction of the mineral cryolite which is imported from Greenland, and its importation determines the quantity of this artificial fluoride that is made. It usually amounts to from 3,000 to 4,000 tons per year, and is used as a flux in open-hearth furnaces, giving the same results as the natural fluoride, which occurs as the mineral fluorspar or fluorite.

Obituary.

While extensive preparations were being made at Marion, O., on the evening of Aug. 26, for the annual excursion of the Huber Mfg. Co.'s employes to Cedar Point, Edward Huber, president of the company, died suddenly of heart disease. Mr. Huber was 64 years old. He was the inventor of the Huber threshing machinery which he had manufactured for a number of years, together with farm engines. He was at the shops until a few hours before his death.

Wm. A. Field, founder of the Fulton Iron Works in San Francisco, died Aug. 14. He was 72 years of age.

John Lowber Welsh, one of the best known financiers in Pennsylvania, died Aug. 22 at Hollbrow, Chestnut Hill, after a long illness. Mr. Welsh was in his 63d year. He was a close friend of J. P. Morgan, and is known to have assisted him in the formation of the United States Steel Corporation. He was a powerful factor in the Cambria Iron Co. and aided in the formation of the Cambria Steel Co. and the Pennsylvania Steel Co. He was a director of the Cambria Iron Co. and of the Phœnix Iron Co. His wealth is estimated at $20,000,000.

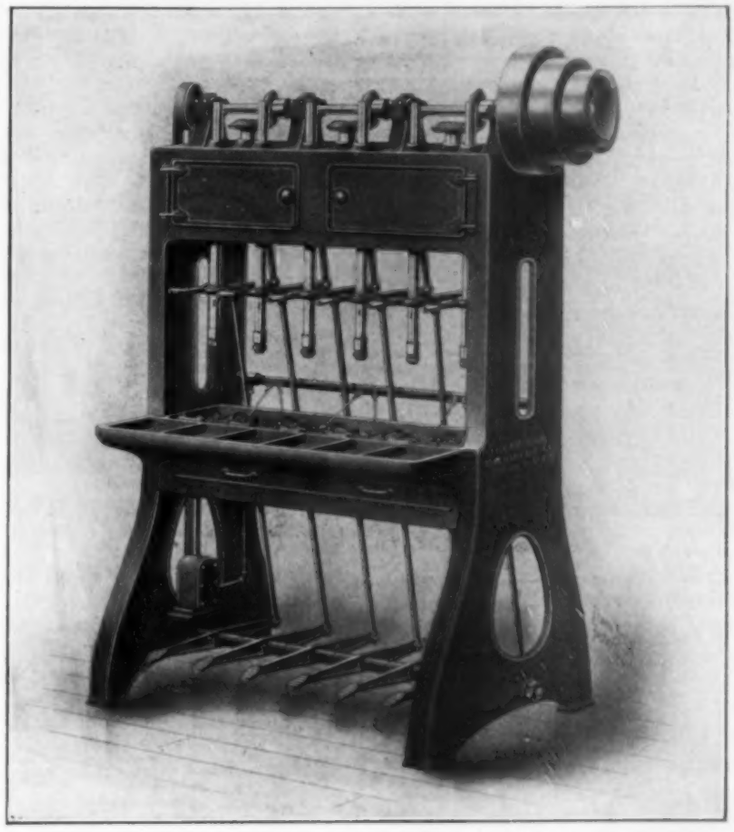
Edward Atlee Schoen, aged 38 years, who with his father, Charles T. Schoen, perfected the pressed steel car, died at Saranac Lake, N. Y., on Monday, Aug. 29, of a complication of diseases. Mr. Schoen entered business with his father in Philadelphia a number of years ago when the manufacture of shapes for wooden cars was begun. Early in the nineties a plant was built in Allegheny for the manufacture of these shapes, and in 1895 the first pressed steel car was perfected. The Bessemer & Lake Erie railroad placed the first order for this new type of car, this road having been built and operated by the Carnegie Steel Co. When the Pressed Steel Car Co., of Pittsburg, was organized, which absorbed the Allegheny plant, Mr. Schoen was elected vice president and general manager, but resigned several years ago on account of ill health. For several years he has been living in New York.

The Pittsburg Steel Co., Pittsburg, has again broken the cotton tie production record, by rolling 1,651 bundles of cotton ties in eight hours. The best previous record was 1614 bundles.

THE NATIONAL NUT TAPPER.

The illustration shows the general appearance of a nut tapper recently placed on the market by the National Machinery Co., of Tiffin, O. The manufacturers have endeavored to secure compactness, simplicity and ease of operation. It is essentially a high-grade tapper, intended for the tapping of small nuts in large quantities with the minimum repair item. The convenience of the operator has been studied, with the result that the useless movements of the attendant have been reduced to a minimum and advantage can be taken of high tapping speeds.

Each tap spindle is equipped with a foot treadle and a hand lever, the latter to be used in starting the tap should the operator allow it to become dull. The taps can be removed or inserted while the machine is running at full speed. However, any spindle may be stopped independently of the others merely by lifting its hand lever to the highest point. Nuts with either right or left hand threads can be tapped with equal facility. The taps can be removed or inserted in the sockets while the machine is running at full speed without stopping the spindles. Gears are cut from solid stock and are inclosed in a housing which protects from dirt and does away with the possibility of the attendant being caught in the gears.



A SIX-SPINDLE NUT TAPPER OF 5/8-INCH CAPACITY.

The rotary pump, shown near the bottom of the machine, forces oil in jets against each tap, lubricating it, cooling it and washing away the chips. The oil and chips drain into two iron drawers with screen bottoms. The screen retains the chips, but the oil filters through and returns to the pump, whence it is again forced up to the taps. Once a day the drawers are removed and the chips dumped out.

The bed is all in one piece and all joints on the side frames are machined. Bearings are scraped and adjustments for taking up wear are provided. The regular equipment includes six taps and tap sockets of any size within the capacity of the machine. The machine is designed for tapping either square or hexagon nuts from 3-16 to 5/8-inch. The floor space occupied is 4 feet 2 inches by 2 feet. The net weight is 1,650 pounds.

The L. & N. railroad has opened an extension of its line from Jellico to LaFollette, Tenn. This will give the LaFollette furnace both L. & N. and Southern Railway outlets.

SPRINGS AND SPRING STEEL.

During a topical discussion at a meeting of the Mechanical Section of the Engineers' Society of Western Pennsylvania, J. L. Klindworth chairman, some comments of general interest on spring construction were submitted as follows:

MR. STUCKI—For helical springs the fundamental formulas are well known and are as follows: The load "P" is in direct proportion to the fiber stress "s." The maximum load corresponding with the maximum allowable fiber stress is also called the capacity of the spring.

The load is also in direct proportion with the deflection "f," and great care should be taken that the maximum load corresponds with the maximum deflection, which is the difference between the free and solid height. If this difference, or total motion, as it may be called, is too great, the spring when compressed solid will be over strained, and if too small, the real strength of the spring is not made use of, which is equivalent to a loss in material pure and simple.

The maximum stress "s" should be taken as 80,000 lb., and the stress under the static working load should not be allowed to run up over 40,000 or 50,000 pounds per square inch. The modulus or torsion "G" taken as 12,600,000, and recommended by Mr. Cloud (Trans. A. S. M. E., vol. 173), has given very good results, and springs designed in this way have been manufactured a good many years without any complaint from the manufacturer's side. Neither have I heard of any serious trouble in service, which is going to show that the requirements of such a design can be met successfully by the open-hearth product. All the car springs adopted by the Master Car Builders' Association are based on this figure.

Although a spring maker assured me that a bar of 2-inch diameter could be hardened without the slightest difficulty—the heaviest bar used in railroad service up to date is 1⅝-inch, and it stands to reason that unless the designer is absolutely compelled to—the diameter of the bar "d" should not exceed this figure. The minimum radius "r," Fig. 1, should at least be 1¼-inch × the diameter of bar to make a successful winding possible. The length of the bar is $\frac{2\ \pi\ r\ h}{d}$ which is to be used in figuring the weight. After the bar is tapered the length is half a turn or π r h greater without, however, having

changed the volume any. The solid height being "h" the free height naturally is h + f.

In the case of double or triple coils, it is essential that the different coils work in harmony with each other—that is to say, the fiber stresses in the different coils should be alike, no matter to what extent the spring may be compressed. All should become solid at the same time ,at which moment the fiber stress should be 80,000 pounds, and in order to obtain such a result, it is absolutely necessary to comply with the two following conditions:

Large diameter: small diameter = large radius: small radius.

Length of large coil = length of small coil.

These are the proportions for a double coil, and if a third one is used, the second and third coil as a pair again must meet above requirements. Generally speaking these rules may be expressed as follows: The proportion between diameter of bar and radius of coil must be the same in all concentric coils. The length of bar must be the same in all concentric coils. It is, of course, understood that slight variations have to be allowed so as to be able to specify bars of such dimensions as are easily obtained in the market.

It is also understood that under certain conditions some of the coils are kept out of action until the spring has compressed a certain amount. They are then called graduated springs. For instance, under some stock cars springs are used, the outer coils of which have strength enough to carry the cattle and to provide for an easy riding motion, but when the car on its return trip is loaded with pig iron or other heavy material to its full capacity, then the inner coils also come into play. In springs of such a nature, no harmonious working can be looked for, and the best we can do is to see

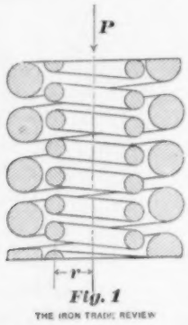


Fig. 1

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HELICAL SPRING PROPORTIONS.

that the maximum fiber stress is reached in both of the coils at the same moment.

The clearance between the different coils is usnally made 1-16-inch all around. This has proven to be sufficient to compensate for irregularities in the different coils.

Elliptical Springs.

The theoretical formulas—old in themselves—are: The load "P," Fig. 2 is proportional to the fiber stress "s" also to the deflection "f." The load, corresponding to the maximum allowable fiber stress, is called the capacity of the spring. "L" indicates the length of the leaves from the bands to the supports under load.

Some writers have included in this dimension 1-6 and sometimes ¼ of the band. However, no reason for such an action has been brought forward except that the band may not fit tightly.

There are other disturbing elements in an elliptical spring which cannot be well defined by figures, such as the friction between the leaves, the stiffening effect of more than on "full length" leaf, and the variation in the length as the spring deflects. Therefore the question of what is the correct length, depends entirely upon circumstances. "L" as above given is more correct than if a fraction of the band would be included. It is easier obtained and has held out admirably well in practice.

"E," the modulus of elasticity, is governed by the original condition of the steel and the manner of hardening same. Twenty-five million, four hundred thousand has been used by the railroad company with which I was connected for years, and it in connection with "L" as above, has given very good results.

It is, of course, easy enough to figure on a higher "E," and it is also easy enough for the manufacturer to harden the steel accordingly, but this point should be carefully watched and a proportionately higher grade of steel must be used, else the material is liable to break under severe service. For this very reason we should design the springs so that open-hearth steel can be depended on, instead of being compelled to look for a higher and more expensive grade of crucible steel. By doing this, the consumer, the spring maker, as well as the steel manufacturer, will be benefited.

Ordinarily 1 percent carbon steel with an elastic limit of about 80,000 pounds is used. By hardening the material, this elastic limit naturally is greatly increased, also the ultimate strength. And I am sure that some of our friends in the steel business can show us some results obtained by tests in this direction. The fiber stress "s" as a maximum should not exceed 100,000 pounds, and the working stress under static load should not exceed 65,000 pounds, if there is room enough for such a spring. If higher stresses must be used, the grade of steel must be closely watched.

One writer used different stresses in different thicknesses of steel, allowing 90,000 pounds for steel ¼-inch thick, and 75,000 pounds when ½-inch thick. I fail to see the reason for such a sliding scale as there exists no difficulty in working ½-inch bars properly all the way through, especially if rolled at the proper heat. Slight variations will, of course, exist, but they should be so small, so as to be negligible in practice, especially since there are so many other factors, causing variations in the quality of the material. The stresses, 90,000, as well as 75,000, are entirely too high; 65,000 would be much better, so that the material can be obtained from the open-hearth furnace. There are, of course, exceptions, where higher fiber stresses and a higher grade of steel will have to be resorted to.

The number of those running the full length is taken as

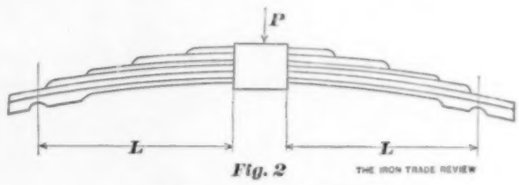

Fig. 2

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ELLIPTICAL SPRING DESIGN.

¼ to 1-5 the total number "n." The rest should be made so as to terminate in equal steps. The load, deflection and thickness of leaves being in straight proportion—charts have often been made to show graphically these relations, also tables have been published to this effect. However, the formulas are so simple that accurate figures can be obtained very quickly. The thickness of the leaves "h" as a rule is not made over 9-16-inch thick, so as to insure an equal temper all the way through. Width of band is made about 1-10 the total span of spring.

In the double elliptical spring, the bands should be made to touch at the moment the fiber stress reaches the maximum allowed. The deflection in this case is naturally twice as great as given in the formula.

G. R. Henderson published extensive spring tables, and Mr. Gaines in the *American Machinist* of July 20, 1899, published some constants.

MR. METCALF—Mr. President, I am very glad to learn that they have gotten the right way at last. When they first adopted the round bar, the Pennsylvania Railroad used a formula which made springs about 33 percent too strong. They claimed it was the fault of the steel, etc., as they worked it out very exactly; and I always had a profound respect for formulas. But we took a 6 x 8 spring that worked too strong. In the first place, I did not believe, and I do not believe yet, that the total stress in a spring is given by any formula, because if you figure out the amount of stress that is given, assuming that that is all compressed by the torsional strain, it means a stress which I think is not possible. That first aroused my doubts. So we put the spring in the testing machine, cleaned the bearing plates nicely and marked the ends of the spring on the plates and closed it down, supposing that the ends might slide around and relieve the strain in that

way; but they didn't move. That didn't explain it. Then we laid the spring up again and marked the exact diameter of the spring on the plate on the two sides and then closed it down again and found that the spring had bulged about a quarter of an inch; in other words, we had pressed out a 6-inch arch an eighth of an inch. That accounted for the excess of strength that was in the spring that the torsion would not account for. There was another difficulty in the formula that was got over. That was a claim that was made in the original papers read here in Pittsburg before the Society of Mechanical Engineers. The paper closed with the statement that the modulus of elasticity of mild steel and high steel and wrought iron, were all the same, and the assumption was, that if you got the spring bar of the right size and worked it out on that formula, it did not make any difference what material it was. After some months, however, when the specifications finally came out, I asked why it was 90 to 110 carbon steel was used when wrought iron would have answered the purpose just as well in the formula. "Oh, the elastic resilience of the high steel was better." However, although these formulas do make a fair approximation, I found the only satisfactory way in which I could get out a right spring was to try it. The largest bar I ever used was 1¾ inches in diameter. That is a pretty large bar. That spring, I think, was over 12 inches in diameter. Mr. Stucki said he did not see why there should be a lower limit of strength put on a 1½-inch bar than a ¼-inch. There is, I think, a very good reason for that. And that is that if you get in the size of steel, you increase the strain in the bending, and you are not as safe in the thicker materials as you would be in the thinner. If you consider a watch spring and the weight of the resilience it drives, and then calculate from that up to a spring, say ½ inch thick and 4 or 5 inches wide, and then tried to use that great big spring to drive a motor of the same relative weight, you would find that it would not do it.

I think there is good reason, then, for a modification. I don't know that the amount you have mentioned is correct, but where there is so much strain in hardening the bars, I think that there is a difference. The chief difficulty in springs is not in the designing or in the preparation, it is in the manufacture. That is where the great trouble lies, and as the gentleman says, a good open-hearth steel is good enough for any practical purposes. When you consider the first specifications that the Pennsylvania Railroad made, they limit the spring steel from 90 to 110 carbon. I thought the limit was too narrow, but I could not prevail upon them to change. Now that close limit is right for elliptic springs; and I see that they have modified their specifications for coiled springs and they now allow steel of any carbons, from 70 up. This was done to give the spring maker freedom and to enable him to use judgment. There is nobody living, or ever did live, that could make uniform springs out of steel from 70 to 140 point steel, if the carbons are mixed together. If the spring maker gets his 70 carbons right, he is bound to have his 120 or 140 carbons too hard, if the men that furnish the material furnish it in mixed lots. It does not cost one cent to keep the carbons sorted and to put all of one carbon one size, and then if he has to make a change at all, it won't hurt the spring maker, if he knows of the change. We have one customer and we can send him springs from 70 up to 130 or 140 carbons, but we never send it to him mixed. If we have to make a change we keep the lot entirely separate and notify him that that lot is a certain carbon.

Now the railroads that don't make any specifications will get that variety of carbons in their springs and you will see what a muss they will get into. They don't know anything about their elasticity or anything else. That is where the chief troubles come in. Then there are other troubles caused by the spring makers; a good many of them abuse the steel. I see it particularly in the railroad shop. The spring steel is abused in such a way that I do not wonder they can not keep the locomotives on the road; and if you would walk through their spring shop, if you know the business, you could see that the springs ought to break. The engineer now comes in and he is practically in as bad position as any of them, or worse. He has got his principal on one side who wants everything as economical as he can get it, and the purchasing agent always wants the cheaper things and goes into the market and accepts the lowest bid, and the engineer finds himself between the devil and the blue sea. He don't know where he is. And that affects the springs of today and they simply ought not to be good. Makers are not charging enough to make decent springs out of them.

A few months ago I read a paper before the American Society for Testing Materials, in which I have treated this subject more fully.

MR. STUCKI—Mr. Metcalf does not seem to trust the formulas for helical springs. However, the designer must have them. If the maximum fiber stress is such, so that the steel manufacturer can meet the same with his merchantable open-hearth product, and if the modulus of elasticity is chosen so that the springmaker does not have to temper beyond a safe limit, there is nothing in the formula unknown or complicated, and it is just as correct as any other formula for shafts and axles subjected to torsion.

The bulging of the springs under the load is natural and absolutely necessary owing to the fact that the length of the bar forming one turn is longer than the circle of the coil radius. The steeper the pitch, the greater this difference. If the pitch is reduced by the load coming on the spring, the bar itself does not contract in length, and necessarily will form a larger circle.

MR. METCALF—When the springs were first made, they came out too strong. We reported that fact and then to justify ourselves, to make sure, I had a lot of bars rolled with very great care, from the exact diameters that the formula called for, cut to the correct length, and I saw to the hardening myself, and they were about 33 percent stronger than the formula called for, and then we gave the springs to the railroad and told them to test them themselves and the result was, the size of the bars were all cut down to suit the facts.

MR. STUCKI—The fact that the springs Mr. Metcalf spoke about were 33 percent stronger than the formula called for, indicates that the modulus of torsion "G" was not in accordance with the temper of the springs or vice versa; 12,600,000 are now used on all the standard railroad springs throughout the country, and I have not heard of any complaints from the spring manufacturer on this score.

MR. METCALF—Well, there is no question about it, if you go hardening a piece of steel perfectly, uniformly, it would not make any difference then whether it was a quarter of an inch thicker or a foot long. But if you would look at any spring bar that has been pretty accurately tempered, you will find a ring, right around the outside, probably a 1-16 to a ⅛-inch thick. The steel is hardened in that far. As you go on into the bar, you will find it a very different grain and very much softer. Now, no man living can harden a 1½-inch bar all the way through. If you take a bar ¼-inch thick and take a nice proper hardening heat on that, you can harden that through pretty fairly. If you take the same bar and diameter, ½-inch thick, it will not be uniformly the same hardness through as the ¼-inch bar.

MR. STUCKI—As to the necessity of allowing a different maximum fiber stress in the elliptical spring due to the slight variations in the thickness of the leaves as now existing on car, tender and locomotive springs, I may say that there would be more reason for a sliding figure covering the modulus of elasticity as the hardening and tempering is very much more affected by a difference in thickness than the ultimate strength. However, the spring maker up to this time has had no difficulty to overcome this apparent trouble; at any rate during the last fifteen or more years I have been designing springs I have never heard of any complaint or suggestion to this effect.

I am also convinced that the steel manufacturer can furnish a nearly uniform material even if the thickness varies slightly, and I have never heard of the slightest difficulty in this direction, and the thickness of the leaves is usually kept below 9-16-inch, not on account of the rolling, but on account of the hardening and tempering process. These two processes affect mostly the modulus of elasticity, and not the ultimate strength of the material.

CHAIRMAN—The point I want to touch upon is, when I have springs designed I use the high modulus of elasticity, the smaller the diameter of the rod is. For a ⅛-inch spring I would use 14,000,000, and getting up to 1½-inch bar, I would use the 10,000,000. The same in the stress; I would not allow as high a stress on the larger diameter as on the smaller. As Mr. Metcalf says the small steel is hardened all the way through, whereas the larger bar is only "skin-hardened," you might say.

THE QUEEN CITY SHAPER.

The engraving, Fig. 1, shows a new 16-inch crank shaper, especially designed for heavy duty. Great care is taken in the manufacture and erection of this machine, insuring a high degree of accuracy. The ratio of the back gearing is 20 to 1, as shown in Fig. 2, for the purpose of deriving full benefit from high speed steels. The column is of large proportions, very heavy, and is reinforced at the proper points to resist working strains. The gearing for the ram is 30¼ x 10 inches. The slides overhang, especially in front, giving the tool increased stiffness.

The ram design is an original feature and the arch construction brings the maximum section of metal into service at the point where leverage is greatest, i. e., when cutting tool is in its extreme forward position. Length of stroke and position of ram can be changed, without leaving the work, and while the tool is in motion or at rest. This is shown clearly in Fig. 3.

The rail has 9-inch front and 1½-inch top wearing surfaces. The gross traverse is 21 inches and the screw has a graduated collar. The vertical adjustment is effected by means of bevel gears, which are protected from chips and dirt, and provided with ball bearings, reducing friction to the minimum. The telescopic screw does away with cutting a hole in the floor.

The rocker arm is connected to the ram by means of a link, properly set, giving a straight pull and an even cutting speed, with quick return. Fig. 3 shows this construction, also the adjustment to compensate for wear of crank shoe.

The table is box form, T-slotted on top and sides, has V for holding shafts and similar work vertically, and can be readily detached from the saddle. The extension provides for a broad clamping surface, utilizing the full length of the stroke. An outer support will be furnished on order.

The vise is planer type and will hold absolutely solid even on angle cuts. It has a base that can be firmly bolted to top or sides of table, and the swivel is held to this base by two steel planer head bolts. The head swivel is held in the same manner; both are graduated, and can be set to any angle, quickly and accurately. The down feed screw to head is provided with a graduated collar.

All flat wearing surfaces are scraped to a standard surface plate, are extremely wide, and so gibbed as to permit of close adjustment for wear. All column holes are unusually long and bushed, providing for the maintenance of original centers. Means have been provided for complete lubrication. Pinions and bevel gears are of steel, as are the vise jaws and bull wheel slide. Gears and T-slots are cut from solid stock; wrench connections are hardened and feed gears are covered. The large opening under the ram provides for the keyseating of shafts and similar work of any length.

This tool is made by the Queen City Machine Tool Co., of Cincinnati.

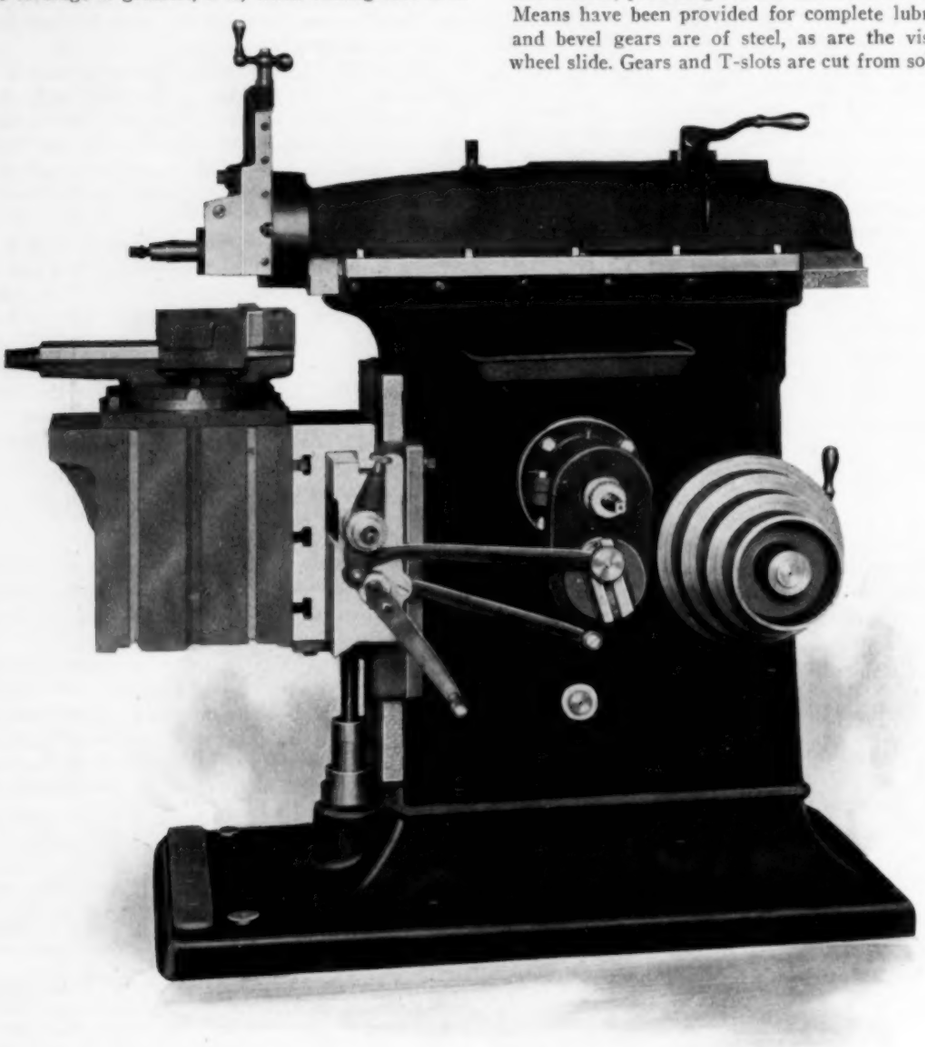


FIG. 1.—THE QUEEN CITY SHAPER.

The United States Register Co., Ltd., Battle Creek, Mich., manufacturer of the Jones side wall warm air registers, has purchased the plant of the Battle Creek Implement Co. This was for the purpose of extending the capacity of the works of the United States company and there will be a considerable increase in the product.

The Landis Machine Co., Waynesboro, Pa., has sold $20,000 worth of reserve stock, and will enlarge its plant, which manufactures the Landis patent bolt cutter.

HAS THE CAPABLE SHOP MAN NO CHANCE?

To the Editor:

In your issue of Aug. 4 is an article headed, "The Chance of the Capable Shop Man." I have read it over carefully several times but I am not at all sure that I can rightly understand it. Not knowing anything of the writer or what his position in life may be, I do not know where he stands in relation to the machine shop, but his position must have been a very peculiar one to have enabled him to get the view he has presented in the article.

Of course it is possible to get all sorts of distorted views of almost anything, and these views may serve a useful purpose if presented for what they really are, but when they are presented as being the normal conditions of the things treated of they may do harm and lead to very erroneous conclusions.

If I understand the writer, in his experience 99 percent of the foremen of this country are grossly incompetent. The qualities that win recognition are narrow-mindedness, lack of mechanical skill, brutality and dishonesty. There is not more than 1 percent of all the chances for promotion within the reach of the man who is honest and capable.

I am glad that in my career as a machinist I have never been so unfortunate as to work in one of the shops where he has had his experience. I am willing to admit that I have worked for foremen who had mean, disagreeable ways, and who I did not think were entirely impartial, but in all of my experience I never met one who was 99 percent meanness, and I never met one who did not use me very decently, on an average. I always made it part of my business to treat my foreman decently, and my observation has been that most shops of any size have some men who seem to want to make things just as disagreeable as they dare to for the foreman. If the writer was speaking from personal knowledge he must have been at some time the proprietor of a machine shop and doubtless picked out his foremen from the 1 percent. In that case he should have certainly made money, or could it be possible that his own lack of success in picking good ones out has given him the basis on which to estimate the percent of good ones in the country?

I have heard some strange tales of how things were managed in the railroad shops of this country, and if that article had been referring to such shops alone I would have to plead ignorance as to how things were done in them, as I have not had any personal experience; but I do want to say that it does not at all represent the conditions in the other kinds of shops in this section of the country. I do not know a shop foreman here who did not come up from the ranks, and neither do I know one who was not a "capable" shop man before he got up, notwithstanding what he may be considered to be now by those men who judge him by what they consider proper standards for a foreman.

Is it altogether the fault of the owners of a business that a man finds that "a prophet is not without honor save in his own country?" Most men who have tried it know that it is much easier to be foreman in a shop where they are not acquainted than it is to be foreman in one where they have been working as journeymen. There are men enough ready to take advantage of former friendships to avoid doing as they should do, to make it hard for the man who has been promoted; and if the foreman should at some future time get to be a shop owner he may give this knowledge some weight in picking foremen for himself.

In one shop where the men knew that some one of their number was likely to get the job of foreman that was vacant the matter was being talked over by a number of the men. One man who had spent his life in the shops and had never been foreman anywhere spoke up and said: "I have had a chance a number of times to be a foreman but I always said no." As the others seemed to be curious to know why he had not taken any of the offers, he added: "I have noticed that a foreman is always considered to be a — — — —— by some of the men, and it don't make a bit of difference how smart he is or how he acts. When he has been working in the shop it is worse for him, for a whole lot of the men think that is a reason why he should not make them do their work properly."

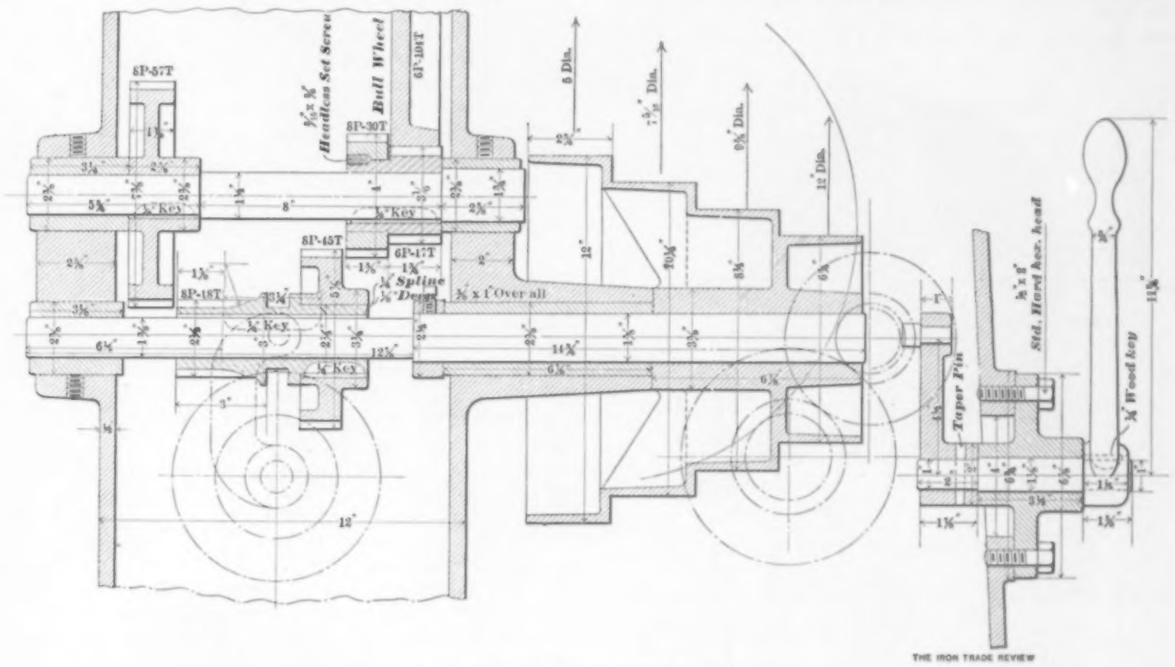


FIG. 2.—GEARING OF A NEW SHAPER.

It might seem strange even to the capable man in the shop who feels that there is not a chance for him to get ahead, if it were looked on as an act of merit for Johnnie to go to sleep at his work even if Johnnie was anxious to be popular with his crowd outside of the shop. Perhaps there is another who is equally as good as Johnnie in other ways and who does not go to sleep at his work.

It does seem hard, no doubt, to a young man who has observed a brand-new idea in another shop and wants to sell it to his foreman in exchange for honor and glory to find that he is turned down with small ceremony, and it may be hard for him to realize that there is more chance for advancement by attending strictly to the work that he is paid to do until he becomes proficient in it than there is in his trying to run the foreman's job and neglecting his own. The ones who are the most ready to show the foreman his shortcomings are usually the ones who do their own work the poorest.

A foreman may differ from the makers of a machine as to the best use of it *under his shop conditions* and not be influenced by jealousy. He may even be wrong in his conclusions and yet act from a proper motive.

It is wonderful how ready some men are to impute wrong motives to their fellow men, and to see in everything that takes place that is not to their mind a sinister purpose. They make me think of old John. John was a tramp blacksmith who had gone to work at a job where Tom used to work. Tom was a fine workman who used to get drunk and raise trouble around town. These spells generally came when the work was crowding, and the last spell he had he jumped the town without warning and went, no one knew where. John happening along was put to work. He was not used to that class of work, neither was he popular with the men, but he did the best that he could. Some of the men, to bother him, used to tell him what a good workman Tom was and how much more and better work he used to do. The foreman did not know this at the time, but he did know that John was doing his best to get the work out and was working every day. Finally Tom came back, and he wanted his old job back again. The foreman did not give him the least encouragement, but not having anything to do he hung around for several days. He met John outside of working hours and told what large day's work he used to do in that shop, being careful of course to see that he told things as big as they really were.

One day John sent a very poor job into the shop and the

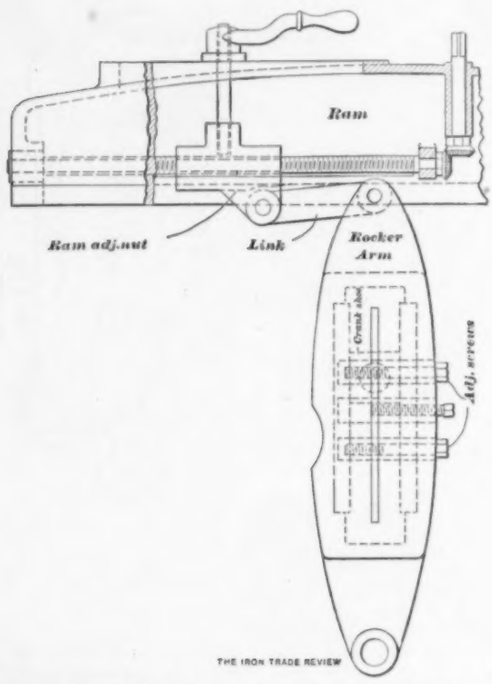


FIG. 3.—RAM AND ROCKER ARM CONNECTION OF NEW SHAPER.

foreman returned it to him. "Here, John, finish this up better and see if you can't get the wind out of it," he remarked, as he threw it down by the anvil.

"Oh, —— it, give the job to Tom if you want to. I knew it would come to this the way the —— —— was hanging around." And John began to untie his apron.

"Don't you like to work for me?" asked the foreman.

"I haven't been kicking any, have I?" said John. "It's that ——— (and he cursed Tom up and down for a bit) who has been making all the trouble."

"John, I wish you would look at this job and tell me how it came that Tom did such poor work on it. It is certainly too poor for any man who pretends to be a blacksmith to send out." John looked at the job and had to admit that it was a poor one, and that it was not Tom's fault either. "Whenever I find anything wrong with your work I intend to come to you about it, and I expect you to do the best you can to make it the way I want it. When I want your job for Tom or for anyone else it will be when you are not willing to do right, and if that time ever comes I will tell you very plainly. You won't need to think that I am hunting for an excuse by finding fault with the work. Now tie your apron on again and try to make up for the time you have lost while you were out of your mind." And Tom never got that job again.

Perhaps in my reading of that article I have taken things too literally, while at the bottom of it might have been the same sort of feeling that stirred an old darky of whom I once heard. He was a slave, Jude by name, who had been given to Mose when Mose was born, and he had had the care of Mose all of that worthy's life.

As Mose was master, Jude had been obliged to put up with his whims, and do as he said. Jude had thought it necessary at one time when Mose was very young to give him a whipping, but in all their lives together Mose had never laid violent hands on Jude, although there were times when he had not been at all choice in his language. Mose owned a small plantation and he would often sit on the fence and watch Jude hoe. One day Jude looked up and said: "Mars' Mose, I wish that you would do sunthin for me. Will you promise to?"

"I don't know, Jude. Let me hear what it is that you want me to do."

"I can't tell 'less you promises. I never ask you to promise before, and I isn't goin' to ag'in."

After some further parley Mose promised and Jude's request was that he be allowed to sit on the fence and boss awhile and be the master while Mose was to take the hoe and be the slave. They made the change and as soon as Jude got on the fence the floodgates of his eloquence broke loose and every hard word that he had ever heard a master throw at a slave he hurled at Mose. It was all the burden of a lifetime that had been dammed up and held in and no wthat the opportunity had come it was let loose. Hard names, fierce denunciation and awful threats followed one another in a way that astonished Mose, while he did his best to fill Jude's place for the time being. Until then he had never known what an awful lot of wretches the masters were, and here he appeared to be the worst one in the bunch. After Jude had said everything mean and hard that he could think of and stopped for want of ammunition, Mose looked up and said: "Jude, let's go fishing." And Jude got off the fence and they went—two men that needed one another just as they had before.

In one way my observation seems to agree quite well with the experience as set forth in the article, "The Chances of the Capable Shop Man," although I might express it in a somewhat different way. I have noticed that the man who thinks he is especially fitted for a boss is very seldom chosen for the position, neither is the man who guides all of his conduct by considering what the effect will be in the way of pushing him forward. There is such a thing as a man spending so much of his energy scheming to get ahead that he has very little time or energy left to apply to more useful things, and it is not easy to get ahead by pulling others back.

A Shop Man.

On Sept. 1 the Cambria Steel Co. will open an office in the Citizens' building, Cleveland, for the sale of its products in that district. E. D. Rogers will be in charge, with F. W. Coxe from the company's Johnstown office, and W. B. Smyth, from the Philadelphia office, as his assistants. They will cover all Cambria products except heavy weight rails, which will be handled as heretofore by W. E. C. Coxe, of Toledo. The company states that it has been satisfactorily represented for several years as to a portion of its business by the Bourne-Fuller Co., but that the tonnage and diversity of its products have so increased that it was considered the importance of the territory justified an office devoted exclusively to Cambria products, as in other large cities.

The American Shipbuilding Co. has closed a contract with the Erie & Western Transit Co. for a large freight and passenger steamer to be a duplicate of the Tionesta of that fleet. The new boat, which will cost about half a million dollars, will be built at Cleveland and will be ready to go into commission May 1, 1905, and will have passenger accommodations for 350 people. The boat will be 360 feet over all, 340 feet keel, 45 feet beam and 28 feet molded depth.

IRON-SPIDER, WOOD-RIM PULLEY.

The Reeves Pulley Co., of Columbus, Ind., has designed and placed on the market an iron-spider, wood-rim pulley which is illustrated below. It is manufactured in three designs. No. 1 is made split and equipped with an interchangeable iron bushing, so that it can be made to fit any size of shaft up to and including 3½ inches by simply changing the

SPLIT PULLEY WITH IRON BUSHING.

bushing. Design No. 2 is made split but is bored to fit the shaft, no bushing being used. Design No. 3 is made solid and bored to fit the shaft. The wood rim is built up of short segments nailed and glued together, the construction being the same as that used in the Reeves wood split pulley. The iron arms extend into the rim and are held firmly by means of an iron pin which precludes all possibility of the spoke working loose from the rim, the construction embodying the well known method of building the arm up with the rim, which is characteristic of the "Reeves" wood pulley. The inside of the rim and all iron parts are finished in machinery black and the face of the rim in orange alcohol shellac. This pulley was designed primarily for dynamo, textile, mill and similar services where a minimum of air disturbance is a desideratum.

The Harrison Safety Boiler Works make announcement of their exhibits at the Louisiana Purchase Exposition, these including Cochrane feed-water heaters, steam separators and oil separators and Sorge-Cochrane systems. The headquarters of the company are at the east entrance of the gas, steam and fuel building, in charge of D. M. Mason. The working installations are numerous, being in connection with eight ex-

SPLIT PULLEY BORED TO FIT SHAFT.

hibits. The largest are one 1,200-h. p. Sorge-Cochrane system at the exhibitors' power plant, two 4,000-h. p. Cochrane feed-water heaters and purifiers, at the exhibit of the Westinghouse-Church-Kerr Co., one 1,750-h. p. Cochrane feed-water heater and purifier at the intramural power plant, and one 1,250-h. p. feed-water heater and purifier at the Philippine Government Board exhibit.

PRODUCTION OF MANGANESE ORES IN 1903.

The report of John Birkinbine to the United States Geological Survey shows that the production of manganese ores in the United States in 1903 was but 2,825 long tons, valued at $25,335, or $8.97 a ton. This limited supply of native ores used in the production of spiegeleisen and ferro-manganese is largely augmented by importations, which amounted last year to 146,056 long tons, valued at $1,278,108, or $8.75 a ton.

The home production of 2,825 long tons is an apparent but not an actual decline of 83 percent from the quantity reported in 1902, which was 16,477 tons. Included in this were 9,000 tons from the State of Montana, reported through the United States Census local agent as mined but not shipped. Subsequent investigation has shown that the ore reported was not even mined, although exploratory work had been prosecuted and a liberal amount of ore exposed. The locations of these reported deposits are not such as to encourage the expectation of immediate development and shipment on a large scale.

In 1903 five States contributed to the production of manganese ores. They were California, Georgia, South Carolina, Utah and Virginia. Of the 1903 total of 2,825 tons, Virginia furnished 1,801 tons, or 64 percent, Georgia 500 tons, and Utah 483 tons. With these exceptions the quantities mined were small. The records show that the Crimora mine, in Augusta county, Va., has been the principal producer of

PULLEY WITH SOLID HUB.

manganese ore in the United States. The maximum output of Virginia was 20,567 long tons in 1886.

In addition to the manganese ores the United States produced manganiferous iron ores in the Lake Superior region, in Colorado, and in Virginia to the amount of 584,493 long tons, valued at $1,571,750; manganiferous silver ores in Lake county, Colo., to the amount of 179,205 long tons, valued at $649,727; and manganiferous zinc residuum, obtained as a by-product in the treatment of zinc ores mined in northern New Jersey, to the amount of 73,264 long tons, with a nominal value of $73,264. The total of manganese and manganiferous ores mined in the United States during 1903 was 839,787 long tons, which had a value of $2,320,076.

Over one-half the amount of manganese ore imported into the United States came from Brazil. The other important sources are India, Cuba, Russia, Chile, Germany, and Spain, ranking in the order named. Russia has been our main reliance in past years, but during 1903 Russia's contribution to the United States was comparatively unimportant, although there are undoubtedly large reserves of manganese in the Sharopan district.

The new furnace of the Boyne City Charcoal Iron Co., Boyne City, Mich., will be blown in early in November. This plant is composed partly of the Martel furnace, which was removed from St. Ignace. Charcoal will be furnished by the Boyne City Chemical Co., whose plant adjoins. The plant will have a capacity of 100 tons of charcoal pig iron a day.

The Schneider Works in France, with Details of the Plants at Creusot and Havre.

BY E. GUARINI.

The Schneider works, of which the most notable is that at Creusot, are to France what the Siemens-Schückert works are to Germany, the Oerlikon construction shops to Switzerland and the Westinghouse plants to England—that is, they are among the most important if not the most important in the country. The Schneider works occupy about 1,940 acres, exclusive of 480 reserved for the workmen's homes, etc., and 3,600 acres of farm land—a total of 6,020 acres. There are several groups of establishments. Those of Cette include blast furnaces, steel works and forges; those of Chalon-on-Saone yards for naval construction, for bridges and carpentry work; those of Champagne-on-Seine, electric shops; those of Creusot coal mines, blast furnaces, steel works, forges, construction shops, electric and ordnance shops and the proving ground of Villedieu. The Decize works consist of coal mines, those of Spain, iron mines; at Havre are ordnance shops and the proving ground of Hoc, the field for long-range-firing at Harfleur; at Mazenay, Creot and Change are iron mines; at Montchanin and Longpendu, coal mines; at Perreuil, factories for refractory and fireproofing products. The total of the office force, mechanics and laborers is in the neighborhood of 15,000 men, and this will be materially augmented by several establishments now in process of construction.

CENTER BAY OF THE ROLLING MILL BUILDING AT CREUSOT.

The starting point of the Schneider works was the old hamlet of Creusot, known at as early a date as 1253. In 1502 a vein of coal was discovered there and an attempt was made to work it. In 1782 the Creusot mine supplied the royal foundries of Montcenis. It passed through various changes of fortune until 1836, the year when Eugene Schneider, then master of the forges at Bazeilles, and his brother, Adolph, worked up the Creusot factories, then called "metallurgical works." In 1847 Eugene Schneider was the sole head at Creusot, and at that time the present title, Schneider & Co., was adopted.

Early and Later Products.

The works were devoted at first to railways and steamboats, then took up armor plate, ordnance, electric machinery, etc. They were the promoters of many of the improvements in all these branches and thus won universal fame. The annual production is 146,000 tons, without counting that of the construction and ordnance shops. This output is divided into 130,000 tons of rolled iron and steel, 6,000 tons of armor plate and 10,000 tons for the naval construction, bridges and carpentry work.

The daily output of the five blast furnaces is 80 tons each. The rolled products sent out up to date reach the sum of 4,872,533 tons, of which 1,926,227 are for railroad materials. The iron foundries produce 10,000 tons annually, and, finally, the hand-forge shops make yearly about 4,000 tons of pieces forged almost entirely of steel.

The buildings and shops at Creusot are too numerous for us even to think of describing them all in detail; the following are a few observations on the most important of them. The section of machinery workshops, given up chiefly to the construction of locomotives, includes eight buildings and has an area of 91,460 square feet. The one which constructs large stationary and marine engines, gas motors, etc., comprises ten buildings and covers 102,220 square feet. The pattern shop measures 850 x 52 feet and is two stories high. The electric works have a total area of 139,880 square feet. The principal building includes three bays, two of them 33 feet span and one 52½ feet. The factory for the spool winding and other fittings has two bays with 33-foot metallic roofs; the area is 32,280 square feet, exclusive of the annexes. The interior lighting is by alternating currents at low voltage; for other purposes electric lighting has replaced gas in the whole factory. The number of incandescent lamps supplied at present is 4,000, and that of the arc lights, 400.

Ordnance Works.

The special ordnance factories at Creusot now cover six and a half acres. The first shop—for the machining of large and medium-sized cannon, coast and shore gun-carriages, and shore and stationary turrets—is arranged in six bays in groups of three, those in the middle being longer and higher than the rest. The southern shop includes three buildings, one with seven bays, 33 x 383 feet, and each of the other two of three bays 33 x 285 feet. There are besides several annexes, three of them near the northern shop, and one near the southern. Near the northern shop a building, 121 x 38 feet, two stories high, is occupied by the artillery service offices; the second building measures 203 x 70 feet, and is used as a storehouse. The third is 96 x 46 feet and is occupied by the steam and electric central station. Alongside of this building are placed the steam boilers, covering an area 88 feet long and

46 feet wide. Near the southern shop, on a site 92 feet long and 59 feet wide, is placed a battery of steam boilers, sheds

GENERAL VIEW OF SCHNEIDER & CO.'S PLANT AT CREUSOT, FRANCE.

covered with corrugated sheet iron, and a building for the drying and bending of wood. The product of the ordnance shops is removed by railroads which form a network over the entire plant. This network, with 186 miles of track, has 300 locomotives and 1,000 cars. The port of Bois-Bretonne, situated on the banks of the Central Canal at Montchanin, offers the most practical facilities for the economical trans-shipment of materials, machinery, etc. The railway service of the company includes 50 to 60 regular trains per day, giving a daily tonnage of 7,000 tons carried an average distance of 6 miles.

The Works at Havre.

The Havre workshops consist of seven compactly arranged buildings, 413 feet long. The western building is 39 feet wide and is occupied by offices; the central one is reserved for the engines supplying power to the workshops, for the testing machines of the metallurgical laboratory, and the balance of the building is given up to the shipping department. The six other buildings are respectively 30, 56, 30, 33, 39 and 49 feet wide, and 20, 30, 20, 20, 25 and 33 feet below the eaves. The 56-foot building is assigned to the machining of guns. The two 30-foot structures are reserved for the machining of small and medium sized cannon; the 33-foot building is for small tools and for fuse manufacturing, that of 39 feet is the gun assembling shop, and that of 49 feet the mounting shop. The seven buildings described above have two annexes, one for the warehouse, infirmary, reception room and guards' quarters, etc., the other for a small forge. The Havre shops are connected with the Havre railroad station by a track going through all the factories.

Electric Equipment.

The lighting is provided by a 500-volt current which feeds 60 arc lights in circuits of 10, and 400 incandescent lamps.

The motive power most generally employed is electricity, but steam has been applied in many cases. At the Havre shops the current of 500 volts supplies, in addition to the lights, the motors of the traveling cranes. The necessary power for the work of the machine tools is supplied by two compound engines of the vertical type. They can run together or singly, and operate the motor shafts at a normal speed of 90 revolutions per minute.

At Creusot the central electric power station for distribution has three wires of 700 h. p. for the ordnance service; it is placed near the northern workshop and consists of three groups. Each steam engine drives, by a single belt, two continuous current generators.

The rest of the installation is provided for by a second central station which embraces three more groups for lighting—two groups, formed each of a single-cylinder steam engine and a Ganz dynamo with continuous current of 128 h. p., furnishing the power for the electric traveling cranes. A third group of the same power is composed of a steam engine like those already described and a two-phase generator formed of two Ganz dynamos mechanically coupled, which feeds the motor of the electrical laboratory, 6,560 feet distant from the central station.

Coal and Iron Mines.

The coal mines worked by the firm of Schneider & Co. are: first, those at Decize, which communicate with Creusot by the Paris, Lyons & Mediterranean railroad, and with the Nivernais canal by a special 5-mile railway; next, the Montchanin and Longpendu coal mines, both connected with Creusot and with the Central canal by a railway leased to MM. Schneider & Co.; last of all, the Creusot coal mines where the shafts vary in depth from 984 to 1,312 feet.

The other mines worked are the iron mines of Mazenay and Change, 19 miles from Creusot, with which place they are connected by a special railway, and by the Paris, Lyons & Mediterranean railroad; and the iron mines at St. George d'Hurtières (Savoy).

The factory for refractory products is near Creusot, 984 feet from the Central canal; the output is 18,550 tons.

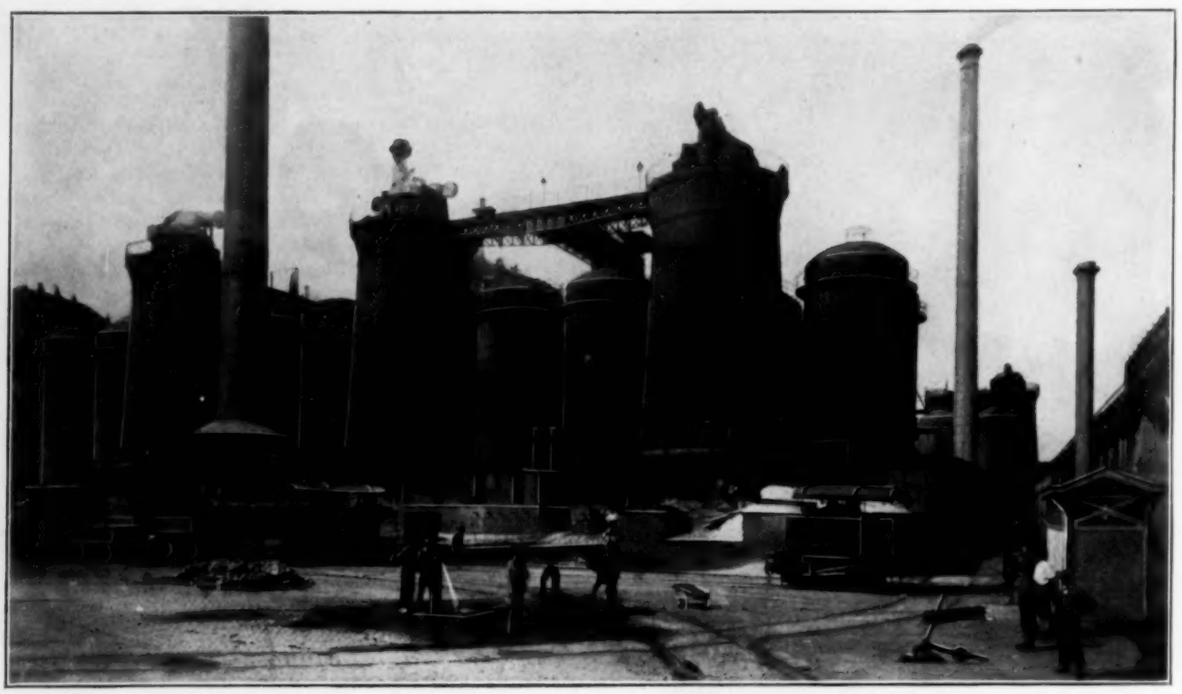
Blast Furnaces and Steel Works.

The blast furnaces include five in operation, 20 Cowper stoves, 30 gas-fired tubular boilers, 6 Corliss horizontal blowing engines. Each blast furnace is served by a hoist. Besides, there is a battery of 155 coke ovens, 12 tubular boilers for the utilization of the waste gases, a plant for crushing coal, two buildings for the storage of minerals, a repair shop, buildings for offices, warehouses, etc. Of the five blast furnaces run-

ning, three produce Thomas-Bessemer iron and two on other grades, including foundry iron. The steel works include four groups of separate factories: 1. Manufacture of steel and steel castings. 2. Forging apparatus for large pieces. 3. Equipment for cementing, tempering and annealing; machine tools for roughing and finishing stock. 4. Tire-making.

In the first group steel is made by both Bessemer and Siemens-Martin processes. For the latter there are four furnaces of a new type, each one able to give 35 tons of steel at a cast. For the large ingots, whose weight may reach 120 tons, a casting trench 130 feet long, 31 feet wide and 33 feet deep has been specially arranged. At one end of this trench there is a press for compressing liquid steel, with a power of 10,000 tons.

The Bessemer group is composed of two converters of 8 tons each, placed in a common trench. An hydraulic crane brings forward the mold beneath the spout of the converter. The buildings of the first group of steel works include the following: the shop where the most complicated pieces are made. Two Siemens-Martin furnaces of 10 tons each furnish the necessary steel. The second annex comprises the building for the rotary puddling furnaces from which comes exceedingly pure iron to be used in the Martin furnaces for making cannon and armor plate. The second group contains the



BLAST FURNACES 2, 3 AND 4 AT CREUSOT.

forging shops for large pieces. It receives the steel ingots and transforms them into armor plate forgings, parts for cannon of all dimensions, barrels, tubes, coiled sleeves, etc. This shop uses three steam hammers at 20 to 100 tons capacity and forging and shaping presses of 1,500, 2,000, 3,000 and 6,000 tons. In this shop pieces of armor plate nearly two feet thick and weighing about 65 tons each have been made. The production of these plates may go as high as 60,000 tons annually.

The tempering shop (in the third group) near the principal workshop, contains special furnaces for heating the armor plate, and the parts for the cannon, tanks and equipment for tempering thin armor in water; another set for tempering large plates in oil, and finally a tank 65 feet deep for oil tempering the parts of cannon. Three traveling cranes of 100, 80 and 40 tons serve for the various manipulations. Near by are the furnaces for the surface hardening of armor plate.

The shops (in the fourth group) for making tires embody all the improvements suggested by long experience. They are connected with the ingot-casting plant by a special subway 1,312 feet long, permitting of the rapid transportation, immediately after casting, of the tire ingots. The equipment makes possible a production of 12,000 to 15,000 tons.

The rolling mills, built about 1860, give employment to 3,000. The power is furnished by 140 steam engines, whose total power is more than 12,000 h. p. Their manufactures include products in iron and steel; the former are obtained by puddling and rolling.

The various operations of rolling are performed in the rolling mill building 1,312 x 394 feet and in the center are all the mills. A whole bay is reserved for the various rolling mills, while a similar one is entirely filled with the heating furnaces. The bays on the left are occupied by tools and accessory arrangements for shearing hot metal, equipment for cold sawing, examination for faults, receiving, weighing, loading and shipping cars. All these operations are greatly facilitated by a large number of overhead runways and mechanical devices for reducing manual labor. The annexes include a testing shop, repair shops and a warehouse for iron, with a capacity of 10,000 tons.

Construction Department.

The construction shops include first all the branches of industry which have part in the manufacture of steam apparatus, the production of moldings for castings, and bronze work, the production of forged pieces of iron or steel, the shops for machining these various products; in short, all the necessaries for manufacturing steam equipment of all kinds. The staff of engineers and draughtsmen engaged in the study and preparation of plans for making the machines is about 100.

There are three foundries. Each has its outfit of steam cranes, cupolas and ovens. The output of the iron foundries is about 10,000 tons per year. They cast all the iron used in the metallurgical department and some of the castings often weigh more than 50 tons. The two cupolas are on a level high above the floor of the foundry. Each is able to melt 10 tons per hour. The foundries have a traveling crane of 60 tons, three steam cranes of 30 tons, 11 steam cranes of 20, and four steam cranes of 15 tons. They are provided with twelve cupolas and two large reverberating furnaces used exclusively for casting the bronze to be used in screw propellers for ships.

The copper foundry possesses a small reverberatory furnace, a large crucible for continuous melting, with mechanical apparatus for casting, and eight ordinary crucibles. The annual output of the copper foundry is about 350 tons.

The hand forge shop is equipped for handling ingots not exceeding 10 tons. It has 22 hammers of 1,100 pounds and up to 10 tons; those of 10, 8, and 6 tons serve the heating furnaces. The smaller hammers serve the blacksmiths in shaping the pieces which because of their form or size must be heated at the forge. The shop has ten furnaces of which six are furnished with boilers which utilize the waste flame. There

are 75 hand forges; they are—at least the small ones—always placed near a steam hammer, so that the blacksmith may work at will with either the steam or the hand hammer. Constant tests are carried on for the inspection of the forged pieces.

The boiler works department makes marine and stationary boilers, locomotive boilers, turrets and platforms for marine cannon, and brass and copper tubes. It produces yearly more than 2,000 tons of steel and iron products, and more than 300 tons of brass and copper. This workshop is provided with many powerful traveling cranes: two of 50 tons, two of 20 tons, and two of 10 tons are assigned to the mounting of marine and locomotive boilers.

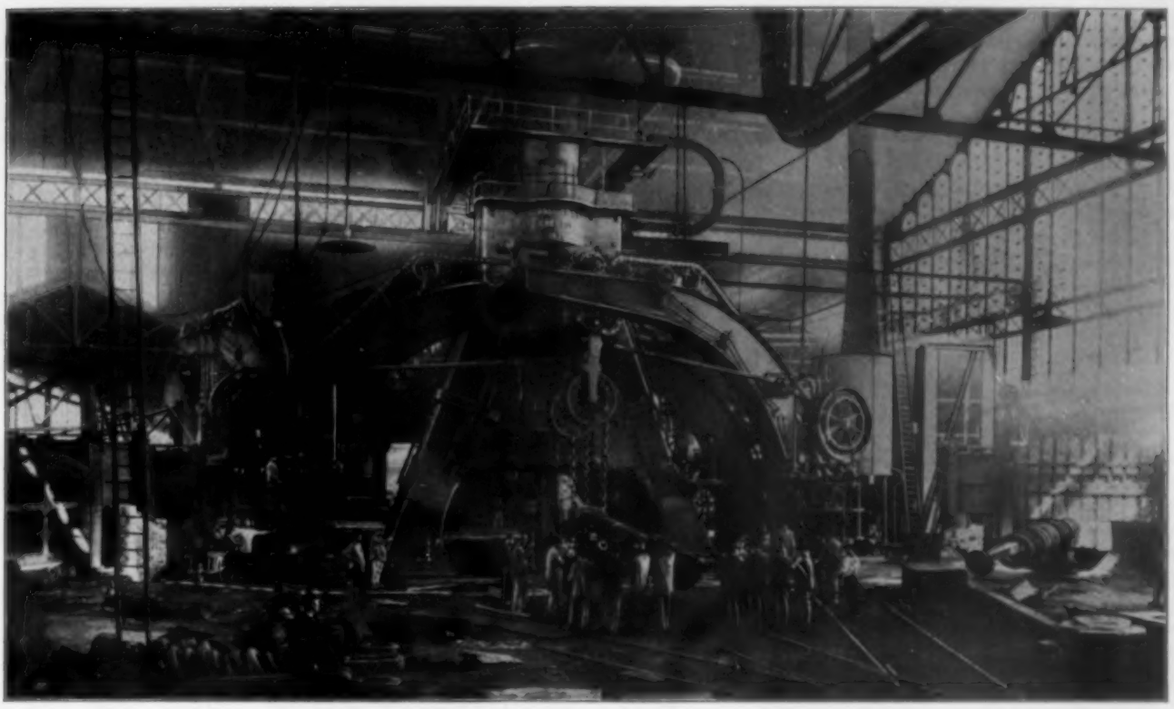
The fitting and erecting department is worthy of still more notice. It has 1,000 workmen, possesses 500 machine tools, and is divided into two sections, of which one makes chiefly locomotives and small torpedo boat engines, and the other, large marine or stationary engines and gas motors. The tool making is centralized in a special shop. All known types of steel are classified there, that the most suitable kind for each sort of tool may readily be used. There too, the most accurate instruments are constructed for the verification of the machines and ordnance.

The electric works construct dynamos, motors, transformers, and all electric supplies for continuous and alternating current. These shops cover 3¾ acres. The mounting of the dynamos of medium size, the fittings, and the winding are all handled in one building. Before being delivered all electrical apparatus passes through a testing laboratory.

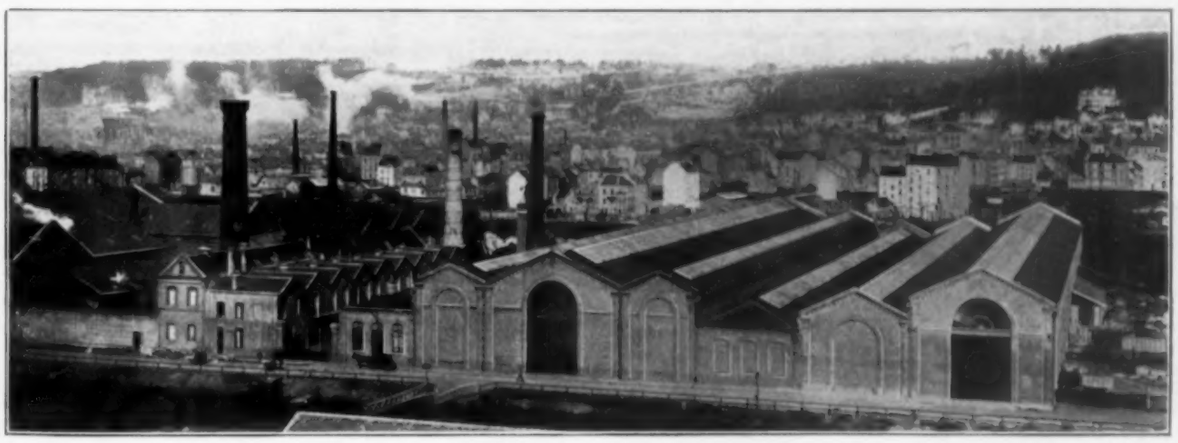
Naval Construction and Advance Work.

This service is concentrated at the ship yards of Chalon-on-Saone whose founding dates back to 1839. Up to 1853 only iron hulls were constructed there, after that time they made metal bridges, had large boiler works, made locomotive tenders; later they made metal caissons for bridges, and last of all (in 1885) torpedo boats.

In the dredging equipment we find hulls of tug-boats and carriers of excavating outfits, the hull of a dredge with two propellers of 400 h. p. for the military port of Rochefort, the hulls of three carriers with a draught of 325 cu. yds. and of two for Russia with a draught of 390 cu. yds.



THE 100-TON HAMMER AT THE CREUSOT PLANT WITH CRANES AND HEATING FURNACES.



THE GUN SHOPS AT HAVRE.

The maritime section, besides the torpedo boats, has furnished many such constructions as pontoon-derricks of 50 and 16 tons, the floating docks and pontoons, 14 freighters and six large 1,000-h. p. tugs for the Rhone Navigation Co., and finally, many lock-gates of which the most recent are those of the Yonage canal.

Since the revolution of 1789 the making of ordnance has

been one of the chief occupations at Creusot. The firm contributed largely to the equipment for the national defense in 1870. The Schneider Co. has recently acquired the ordnance outfit of the "Forges and Shipyards of the Mediterranean," then joining this service with that of the Havre shops, which depend upon it, to the Creusot plant, the company has formed an organization which makes it possible for French manufacture to compete successfully with foreign establishments.

Among the largest tools in use at Creusot are two machines for reaming and boring cannon—7 feet swing and 50 feet traverse; rifling machine of 46 feet stroke; a large vertical lathe with horizontal plate capable of turning 19½ feet in diameter. The boiler works includes an hydraulic press of 150 tons.

The artillery service occupies three proving grounds situated at Creusot, at Havre, and at Harfleur. The two near the shops are devoted to the testing of different constructions, and to firing at armor plate. The third is especially given up to long range ballistic practice, to the experimental study of firing tables and to trials of fuses and explosives.

The Cette factories and those at Champagne, now almost completed, will be devoted to metallurgy and electricity respectively.

Benefits for Employes.

The most complete measures have been taken for the safety and health of the employes. The stability of this body of men is very remarkable. One-third have served more than 20 years, one-fourth more than 25, and one-eighth more than 30 years. The employes receive the profits also of various grants. These subsidies sometimes reach an average of 2,208,770 francs annually. The savings of the workmen are received in deposit, at rates varying from 5 to 3 percent. The ownership of homes is encouraged by purchases of land and by loans. Most of the rented houses—1,334 dwellings—have gardens of from 7,500 to 8,500 square feet. Every quarter Schneider & Co. make payments, without deductions from the salaries, for the sake of insuring to the employes vacations proportional to their terms of service. Considerable contributions are made also to the benevolent organizations. Schools for the employes of the factories, and their children are maintained at the expense of the firm, and have a teaching force of over 100 persons. A house gives comfortable shelter to 70 old men and women. Medical attendance is provided without deductions from the salaries. A hospital of 128 beds provides for medical service at home or in the hospital in case of injury or of illness.

Wages in the Krupp Works.

Consul-General Richard Guenther, Frankfort, Germany, reports that according to the published statement of the Krupp Works the total number of persons employed by the firm on April 1, 1904, including 4,190 officials, was 45,289. Of these the steel works at Essen employed 25,041, the Gruson works at Buckau 3,329, the Germania shipyard at Kiel 2,811, the coal mines 7,877, the iron mines, etc., 6,231. The average daily wages in the steel works have been as follows:

1853	$0.32	1890	$0.85
1860	.32	1900	1.14
1870	.73	1901	1.00
1875	.93	1902	1.08
1879	.72	1903	1.09

Production of Abrasives in 1903.

The report of Dr. Joseph Hyde Pratt on the production of abrasive materials in the United States in 1903, recently issued by the United States Geological Survey, gives the aggregate value at $1,493,303, the largest yet recorded. For 1902 the total was $1,326,755. Concerning corundum it is stated that the United States formerly produced all the corundum used in this country, but the importations from Canada and India are now largely in excess of the home production. Mills for cleaning corundum have, however, been recently completed near Salesville, Mont., and at Buck Creek, Clay county, N. C., and will probably be factors in the production in 1904. Corundum was found during the year in Buncombe county, N. C., a few miles north of Asheville, near Norris, Madison county, Mont., and on Saxen Mountain near Georgetown, Clear Creek county, Colo. Dr. Pratt devotes some space to a description of the Canadian deposits of corundum.

A description is given in this report of the manufacture and uses of carborundum. When first manufactured it was put on the market solely for abrasive purposes, in the form of wheels and stones of various shapes and sizes, or as paper and cloth and as grains, and while the largest use of this material is still for such purposes, some is now used in the manufacture of steel and for making refractory vessels and articles.

The Pittsburg Crushed Steel Co. is the sole manufacturer of crushed steel. Its production varies little from year to year.

The manufacture of artificial corundum from bauxite was carried on by the Norton Emery Wheel Co. at its plant at Niagara Falls much more extensively in 1903 than in 1902, and the continued production of the material in the form of wheels and stones is now assured.

National Enameling & Stamping Co.

The annual report of the National Enameling & Stamping Co., for the year ending June 30, 1904, has just been issued. Gross earnings decreased by about $715,000, and the company drew on its surplus to the extent of $337,880 to meet charges and dividends. The amount charged for the depreciation of property was $54,435 against $94,434 in 1903 and $132,129 in 1902. The amount carried for surplus to general reserve was $250,000, as compared with $500,000 the previous year. The total of this reserve account now stands at $1,000,000. Bonds to the amount of $249,000 were redeemed during the year, and current liabilities increased about $800,000. The net profits for 1904 were $1,040,564 against $1,756,783 in 1903 and $1,988,429 in 1902. President Niedringhaus says in part: "In view of the disturbed commercial conditions which existed during the year, particularly in the reduced valuations in the iron and steel industries, your directors consider this result satisfactory; and taking as a basis the low values at which the inventories were made, and the strong probability that the prices have about reached their minimum, look with confidence for an increase in the earnings of the current year."

Rand Drill Co. is shipping an Imperial compound compressor to be used on the extension of the Chicago drainage canal. A compressor of the same type is already in operation on this work and is furnishing compressed air for ten Little Giant drills. The two compressors have a combined capacity of 3,400 cubic feet of free air per minute.

The Perkins Machine Co., of Warren, Mass., which recently moved from South Boston, as its plant there was too small for the increased business, is running night and day to execute the large orders it has received. The company has been obliged to add to its equipment, having installed a Pawling & Harnischfeger three-motor, electric traveling crane of the latest model.

The Huetteman & Cramer Co., Detroit, Mich., has elected the following officers: President, A. F. Cramer; vice president, F. Huetteman; secretary-treasurer, F. J. Huetteman; and general manager, Charles J. Diedrich. H. C. Wiedeman, who had been the treasurer and general manager of the company, resigned to give his entire time to the management of the Detroit Steel Cooperage Co.

Systematic pay roll padding, involving in the aggregate a number of thousands of dollars, is charged by the American Steel & Wire Co. against a number of its Waukegan, Ill., employes. Six arrests have been made.

The city of Cleveland is considering the adoption of high pressure service in the downtown districts for fire protection. The estimated cost of the project is $300,000. It will require 43,350 feet of pipe, part of which will be ten inches and part sixteen inches in diameter.

The Standard Bolt Co., Alliance, O., is removing its plant from that city to Fort Worth, Texas, where new buildings are being erected. A rolling mill will be a part of the new plant. It will have excellent railroad facilities and cheap fuel from the Beaumont oil fields.

A PATTERN RECORD.

BY R. W. MACDOWELL.

The problem of patterns and pattern room has vexed many foundrymen and patternmakers and probably will for years to come. Patterns accumulate from time to time, especially in a shop that is not confined to one special article or class of articles, and it is a proposition to keep a satisfactory record of them, as well as to have them in such shape that they can be got at without a long and wearisome search every time an old pattern is required. This of course refers particularly to the general jobbing shops with orders for all classes and kinds of castings. In a shop making car castings, for example, there will be many patterns for one order, which will not be needed for a long time after the order is completed, although it is certain that they will be required for similar work at a future date. After a few years of this process of making patterns and using them, then storing them away, you have an accumulation around the shop that is appalling, and when some special pattern is required it is a long and laborious task to pick it out. The practice in many shops is to leave the care of this department to one of the employes who has become familiar with the patterns through long association, and who can usually be depended on to get anything required in a reasonable time (by the aid of a good memory and a knowledge of "where he saw it last"), and in a great many cases it cannot be denied that this method seems to work very well. It has the disadvantage, however, that the employe in question may not always remain in your service, and that he may be absent at a time when something in his line is very badly needed; not to mention the troubles you have when taking stock, and the hazy ideas as to the value of the patterns on hand.

PATTERN SHOP ORDER ORDER NO. A 175

KEYSTONE FOUNDRY COMPANY

To J. B. Hill

PLEASE PREPARE FOR Order 579

THE FOLLOWING, TURNING IN ORDER WHEN WORK IS COMPLETED.

DATE. 5/20/03

NUMBER	ARTICLE	PATTERN NUMBER	WEIGHT	MACHINE WORK
1	Spring Seat Wood Pattern, V-1947 Tracing 2047 B. Wanted by 6/5/3	105		

KEYSTONE FOUNDRY COMPANY

PER J. M. C.

REQ. NO.		PRICE		

ACCT		CLASS	COST	

FIG. 1.

The best plan in our estimation is to have a building devoted to the pattern department; if this is not practicable have at least a good sized room. If you have a pattern shop, let the pattern room adjoin it, as this will be found much more convenient. Provide spaces, shelves, etc., for the different styles of patterns, on each of the four sides of the room, and number the spaces to correspond with the pattern numbers. We think the best way is to simply number from 1 up, although others might find it better to run them in series, prefixing the letters of the alphabet to each series, as A5, G98, etc. In any case it is well to give additional numbers to the

105

NAME OF PATTERN Spring Seat

B.S.Co. order 579

PATTERN NO. 105

DRAWING NO. 2047-13

DATE	MATERIAL	NUMBER OF PIECES	COST	WEIGHT OF CASTINGS
5/29/03	Wood		$4.53	40#

REMARKS (CHANGES, ETC.)

7/15/03 Changed to weigh 35#

8/1/03 8 Iron Patterns #105 5.44

Ea. 68¢

LOCATION

ROOM 1 1

RACK C

SHELF 19

SIDE 3 2

Wood Pattern Iron Patterns

FIG. 2.

shelves, in order to locate a pattern with more ease. A separate room should also be provided for patterns which are not likely to be used again, and an entry should be made in your pattern record whenever a patron is transferred from the regular pattern room to the "graveyard."

When a pattern is to be made, a shop order should be filled out, and the blue print or drawing accompany the order to the pattern shop. All time and material spent on this order should be charged up against the cost of the pattern. A form of this order is illustrated in Fig. 1. In making the pattern care is observed to get the order number in a place where it can easily be found, using the ordinary pattern letters for the purpose.

As soon as a pattern is completed and the order turned in to the office, a record should be made out. This may be in book form, a card, or a loose sheet. We illustrate the card form, as we think it the most convenient, but a loose sheet, or book leaf could be arranged in a similar manner. Both sides of the card are used. On the face is given the name of the pattern, the number, weight of castings from the pattern, and a space for remarks. On the reverse side we have the number, date, and information pertaining to the cost of the pattern. If there is more than one pattern on an order, the cost of one is noted on the reverse side, while the total cost is noted on the face, for convenience in listing. In the form shown (Fig. 2) there is an entry of 8 iron patterns made at a later date, but this is not really necessary, as when later patterns are made bearing the same number as the original, there should be a card made out in the same way and filed behind the original card. These latter cards should not bear tabs, as the original card will serve as an index. Either method may be used, however. Fig. 2 shows front of card record and Fig. 3 is reverse of this card. Some concerns may wish to keep the record of all duplicate patterns, bearing the same number, on one card, while others prefer a separate card for every order issued. Personally, we think the latter method the best.

In regard to the location of the patterns, a good plan to adopt is to keep them as nearly as possible in numerical order. We say "as nearly as possible," for the reason that there may be some few patterns made which would be too large to go in the space which would ordinarily bear their number, so that they would have to be put somewhere else. This is not common with patterns like those where this system has been in use. Of course, conditions vary so in different shops that it would be impossible to lay down a fixed rule for the numbering and arranging of patterns; some might find the above plan just suited to their needs, while others would find it impracticable. But in most cases the general outline of this will be found satisfactory and the cards can easily be modified to suit the arrangement of the patterns themselves.

For the use of anyone who does not like a card record, or who wishes to keep his pattern record in book form, a loose sheet record is illustrated (Fig. 4). This will often be found very convenient where there are not many patterns, or where it is desirable to run them in series. In the latter case a sheet can be made out for each series, each sheet bearing the series letter that is used for each particular class of pattern. The sheet illustrated shows the "D" series, and provides spaces for the pattern number, name, and material, the date it was made and the order number, the location, remarks and the cost. This latter item is obtained from the shop orders, the same as on the cards, and two columns are provided, one for the cost of each pattern and one for the total value of the patterns of that series. When a pattern is disposed of in any way, the value of each column is crossed out and the totals, which are carried in lead pencil, are changed. This makes it a very simple matter to keep track of the value of the patterns on hand at all times, and is convenient at stock taking. The accurate index given for the location of patterns, makes it a very easy matter for anyone to go and pick out a pattern without having to depend on any person's special knowledge of its location, and to replace such patterns when through

PATTERN NO.	105
DATE MADE	6/4/03
USED ON	Order 579
SHOP ORDER NO.	A 175
TAKES PLACE OF	Old spring seats. Tracing 2047-A
KIND MATERIAL	Wood
COST MATERIAL	1.18
" LABOR	3.40
ROUGH WEIGHT	40#
FINISHED WEIGHT	
NET COST	4.58
TIME	8½ M H.
PER HOUR	40¢
PIECE WORK	
LIST PRICE	

FIG. 3.

SERIES D
SHEET 1

PATTERN RECORD

NUMBER	NAME	MATERIAL	MADE DATE	MADE ORDER NUMBER	LOCATION SIDE	LOCATION SPACE	LOCATION SHELF	LOCATION DIVISION	REMARKS	COST EACH	COST TOTAL
D. 1	Separator 5x8	Wood	9/18/2	A. 16	1	1	4	D	Scrapped 5/23/03		
" 2	" 5x9	"	9/11/02	" 21	1	1	4	D		68	68
" 3	" 5x9	"	"	" "	1	1	4	D		68	68
" 4	6 " 2x6	"	9/19/02	" 23	1	2	4	D	B. L. Co 519	30	1 80
" 5	4 Center Bearings	Iron	11/18/02	" 69	1	6	8	D		46	1 90
" 6	5 "	"	11/18/02	" 73	1	6	8	D	Sv. 678 D	120	6 00
" 7	End Rest	Wood	12/1/02	" 86	1	3	5	D		4 18	4 18
" 8	5 " "	"	12/16/02	" 118	1	3	5	D		4 25	21 25

FIG. 4.

with them. Of course it must be understood throughout the shop that as soon as the order is completed the patterns used on it must be returned to their proper places, and it is a good plan to have some one person kept in charge of the pattern room if the number of patterns is sufficient to warrant it, or if there are not many patterns, to have the foreman and no one else get patterns when needed and return them when through with them.

The last form given can also be adapted to the numerical system of arranging patterns if so desired, by simply starting at No. 1 on the first sheet, and filling in additional sheets as needed. The form of the sheet would not have to be changed, and the location could be noted in the proper columns according to the arrangement of the patterns. Both of the arrangements have their advantages, and can be worked readily with either the sheets or cards. By running the patterns on the sheets, in series, it is much easier to determine the value of the patterns on hand, besides being a very compact record, while the use of the card allows a varied style of indexing, it being practicable to index by numbers, series or alphabetically, or in combinations of two of these methods. The card also provides a more complete record of the cost, etc., of each pattern, and would be preferred by many on this account.

Either system, however, is far better than allowing patterns to accumulate with no other record than is obtained at the yearly stocktaking, and we think could be adopted with modifications in many shops. Records of this kind can be kept with little trouble, and the advantages derived therefrom more than balance the slight clerical labor required for their maintenance.

The Peoria Steel & Tool Co., Peoria, to which reference has been made in these columns, has been organized with an authorized capital of $250,000. The incorporators are: Frank H. Farnham, Ralph N. Bailey and Geo. T. Page. The company will include the Automatic Vise & Tool Co., of Akron, O., the Farnham Cutlery Co., of Fremont, O., and Bridge port, Conn., and the Bergram Tool Steel Co., of Pittsburg. Bids will soon be called for and the construction of the plant will be begun. Frank H. Farnham, president of the company, is from Chicago.

The Warren Independent Steel Co., Warren, Ill., has elected the following officers: C. F. Taylor, president; L. C. Russell, vice president; R. C. Cullen, treasurer; and J. L. Graham, secretary. The company will erect three buildings, the main structure to be 60 x 100 feet.

The property of the Fore River Ship & Engine Co., Quincy, Mass., will be sold Sept. 7 to satisfy a mortgage held by the Adams Trust Co., of Boston, Mass.

The plant of the Finished Steel Co., Haselton, O., has been closed down and will remain inactive until business improves.

AN AUTOMATIC FORMING LATHE.

BY DR. ALFRED GRADENWITZ.

Accurate and inexpensive machinery of figured pieces on lathes has thus far been obtained either by means of forming cutters or with the aid of patterns and simple turning tools, other methods being resorted to only in exceptional cases. Formed cutters are being used advantageously in the working of small objects, whereas larger pieces of work can be worked with their aid only in a peacemeal way, this course being moreover expensive and slow, on account of the repeated exchange of the necessary cutters until the required shape is obtained. In the machining of larger shapes, patterns in connection with simple turning tools were therefore preferred.

The simplest pattern in turning shapes is the curved templet. The latter may, however, be used only where there are no sharp curves in the profile to be turned, as for instance in the case of projectiles, the point of which is readily formed with the aid of a templet. Patterns susceptible of a longitudinal and rotary movement have therefore to be used in special cases, as for instance in connection with lathes for turning the flanges of railway car wheels. Now, as the use of these patterns is quite out of the question in connection with any greater length of profile, numerous shaped pieces, such as connecting rods, cross heads, piston bodies, cylinder covers, etc., have to be worked out by hand. The forming automatic lathe on the Schuberth system, as brought out by

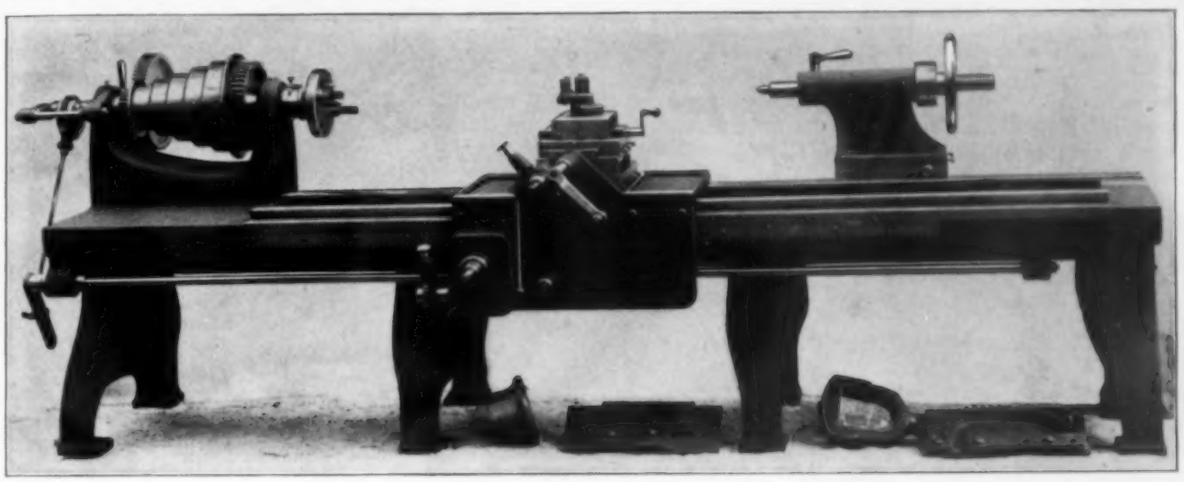


FIG. 1.—A NOVEL FORMING LATHE.

Emil Köhler, of Chemnitz, Germany, is intended to eliminate these drawbacks, profiles of any curvature and length being readily dealt with. The patterns are similar in shape to the familiar templets. The turning tool is carried along the profile to be worked out with a uniform motion. The point of the cutting tool would always traverse equal lengths on the periphery of the profile in equal times.

As the copying pencil and the turning tool perform the same curved movement, and as they are in immediate connection, any errors in copying are impossible. The copying gearing is very simple and handy and the risk of its few parts being readily worn out is of little account. The pattern and connections may also be discarded easily and the lathe is then suitable for turning rectilinear objects.

Fig. 1 gives a general view of the lathe. The head and tail stocks are of the usual shape, whereas the slide rest has a special shape, and is carried on the ways of the portion of the bed projecting to the front of the machine. The rest is driven from the headstock by means of eccentric discs and peculiar guides which are shown in the line engravings.

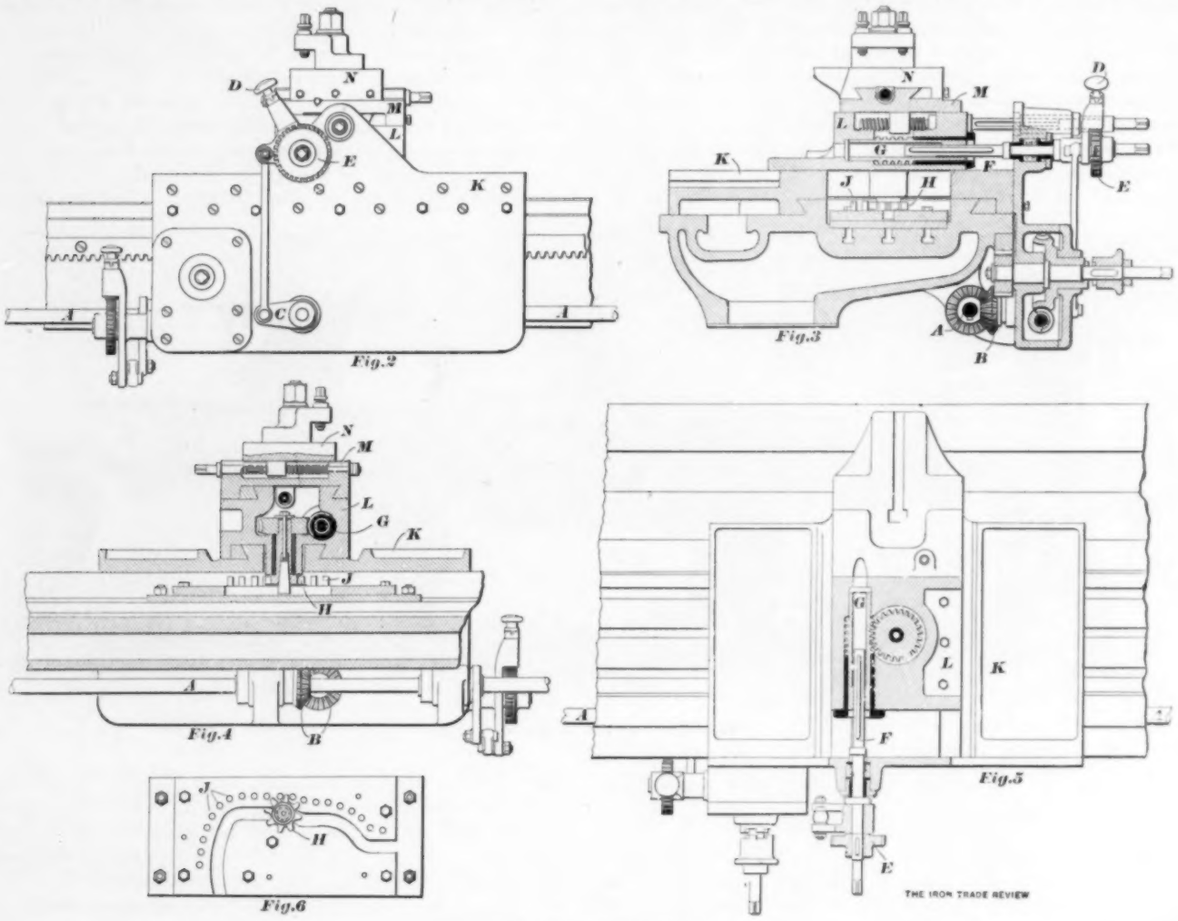
In Figs. 2 to 4, the slide rest with part of the bed is represented in front view and cross section respectively, while Fig. 5 shows a plan. In Fig. 6, there is seen the portion of the bed covered in Fig. 5 by the slide rest, an exchangeable pattern or templet placed on the latter. The small toothed wheel seen in Fig. 6 belongs to the slide rest to which it transmits the movement in copying, according to the pattern.

The slide rest is operated in this way in copying irregularly shaped pieces. An eccentric disc (Fig. 1), fitted to the rear end of the headstock spindle drives the slotted shaft A (Figs. 2 to 4), placed in front and beneath the bed, giving an oscillating movement of an adjustable amplitude, by means of a connecting rod and slotted lever. The oscillating movement of the shaft A is transmitted by the toothed wheels B (Figs. 3 and 4), to the bolt, the lever C and the connecting rod and angular lever. The latter bears a spring bolt D (Figs. 2 to 3), susceptible of being engaged with the teeth of the controlling wheel E, and when the lever oscillates this causes the controlling wheel E to be put in motion. If the spring bolt D be lifted a little and turned by 90 degrees, the feeding movement of the controlling wheel E will cease, whereas in the case of a further rotation of the bolt by another 90 degrees, the switching movement of the controlling wheel E occurs in a direction opposite to the previous one. The controlling wheel E is rigidly connected to the shaft F (Figs. 3 to 5), effecting with each oscillation a portion of a turn of the worm G (Figs. 3 to 5). The shaft F, being capable of a disconnection from the worm G, is fitted with two spring wedges carried in corresponding keyways in the worm. As the worm G (Figs. 4 and 5), continuously engages with the wheel the latter transmits its motion through the vertical spindle (Fig. 4) to the small transport wheel H. On the transport or copying wheel H, rotating on the curved rack J formed by a row of pegs, the copying pencil extending through the center of H will slide in the gulding slot of the pattern, thus ensuring on the one hand the regular motion of the slide rest and on the other hand the proper engagement of the guide wheel H with the pegs of the rack J. The guide wheel H cause the slides K and L (Figs. 2 to 5) to move. The lower one of these two slides, K, will slide right and left only on the bed, while the upper slide, L, performs in addition a transversal movement from front to rear corresponding to the curvature of the pattern, on the back of the slide K. This allows of a universal movement of the tool rest.

The two upper slides, M and N, in Fig. 4, are merely intended for adjusting the turning tool. As a matter of course, any points of the slides, L, M and N, as well as of the turning tool fixed to the upper slide N will have to perform the same curved movement as the copying pencil. On the right-hand side, in the general view given in Fig. 1, the same pattern as in Fig. 6 as well as a connecting rod end turned from the pattern, will be seen under the lathe. On the left-hand side there is a roller with the normal profile of the wheel rims used by the Saxonian state railways, together with the corresponding pattern plate.

In the case of the machine being temporarily used as ordinary lathe, the pattern is removed, when the controlling gearing required (Figs. 2 and 3) has only to be inserted by disconnecting a coupling box.

In order to avoid any injurious influence of the wedging friction in the slotted shafts, these are placed in spring bearings. As the patterns necessary in copying do not undergo any high pressure they may be made from cast iron. The rack J of the pattern plate consists of smooth rods of Stubs steel, susceptible of undergoing a pressure up to and over 2,000 kg. and this strength excludes any risk of a break.



DETAILS OF FORMING LATHE.

The Greer-Clarkson Co., Ltd., Manheim, Pa., recently organized for the manufacture of the Mattison automatic forming machine, will build a line of electric hoisting machines, for which a number of contracts have been secured from the United States Government.

The stockholders of the Hickman Scale Co., DesMoines, Ia., which recently became involved in bankruptcy proceedings, have practically effected a settlement of their affairs and intend to resume business in a short time.

George F. Gephart has petitioned for a receiver for the Cumberland Foundry & Machine Co., Cumberland, Md. He is a stockholder and a director. Lloyd Lowndes Jr. is president of the company.

THE WORTHINGTON STEAM ACCUMULATOR.

While the use of steam accumulators for storing hydraulic power is not new, it is only within the last few years that this machine has received much attention. Fig. 1 illustrates a horizontal accumulator of this type manufactured and patented by Henry R. Worthington. It consists of an ordinary steam cylinder such as would be used in a steam engine, excepting that it has neither ports nor valve, combined with a ram cylinder similar to that of a weighted accumulator. Instead of a weight, a steam piston, acted on by a fixed steam pressure, exerts the necessary force on the ram. The ram is securely bolted to the piston and passes through two stuffing boxes, one in the steam-cylinder head and the other in the ram cylinder. The stuffing-box in the steam-cylinder head is lightly packed, as its only office is to prevent the leakage of the exhaust steam which is led into the back-end of the steam cylinder to keep hot the walls of the cylinder and piston.

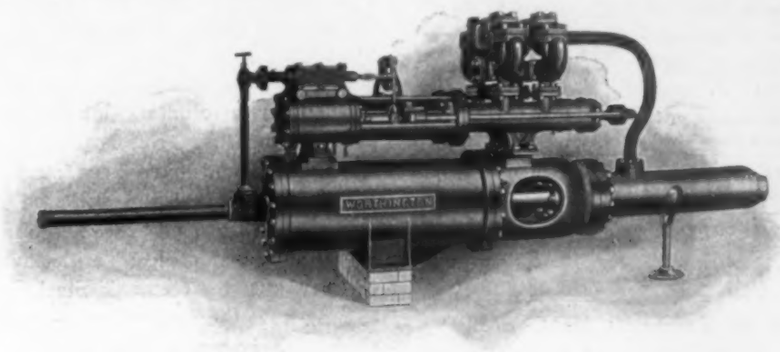


FIG. 1.—THE WORTHINGTON STEAM ACCUMULATOR OF HORIZONTAL TYPE.

The supply of steam to the pump is regulated to meet the variations of consumption of water in the following manner: The regulating pipe consists of a polished, perforated pipe of proper diameter, which at its closed end is fastened to the accumulator steam piston, and passes through the center of the accumulator steam cylinder head into the interior of the steam supply pipe, the joint between the perforated pipe and the cylinder head being made by a long self-adjusting sleeve. The steam supply to the pressure pump is taken from the steam supply pipe to the accumulator steam cylinder through the holes in the regulating pipe, thence through an opening in the wall of the steam cylinder to the pump, the holes in the regulating pipe being distributed spirally throughout its length.

FIG. 2. — STEAM CYLINDER AND RAM ARRANGED VERTICALLY.

The position of the accumulator steam piston, which depends on the amount of water stored in the ram cylinder, governs the number of holes in the regulating pipe opening into the interior of the steam cylinder, and so controls the amount of steam supplied, and hence the speed of the pump. In service, as the ram cylinder fills, the speed of the pump decreases, until just before the steam piston reaches the head of the accumulator cylinder all the holes in the regulating pipe are shut off by the sleeve in the cylinder head, thus stopping the pump. As the water is drawn off from the ram cylinder, the number of holes uncovered in the regulating pipe gradually increases until enough are open to drive the pump at its full speed. By this arrangement, variations in the speed of the pump are gradual, which is essential to the quiet operation of a heavy-pressure pump on a varying consumption of water. The steam in the steam cylinder is maintained at a constant pressure by means of a reducing valve located in the steam pipe just before it enters the cylinder. This valve is set at a pressure not exceeding the minimum pressure carried in the boiler, thus insuring a constant pressure at all times in the cylinder. Fig. 2 shows a steam cylinder and water ram of the accumulator as set in a vertical position and ready for connection to pump to give a continuous flow of water under pressure.

An important advantage of this accumulator over a weighted accumulator is the effect on the water pressure. The steam accumulator is not subject to the shocks and jars due to the momentum of the weighted accumulator. The moving parts being so light that momentum is not a factor, the machine is very sensitive and the variations of the water pressure very slight. As the steam pressure is regulated by a reducing valve this can be adjusted and varied at will. The steam accumulator can be placed either horizontally or vertically, and as it is not heavy it can even be hung from roof beams if necessary.

At first glance the condensation of a steam accumulator might seem to be quite an item, but when it is understood that the steam pressure is constant on one side of the piston, and that the cylinder is not being constantly filled and exhausted like a steam engine, it will be seen that the only loss by condensation is from radiation, which, when the cylinder is well clothed, is said to amount only to about one percent.

Some of these accumulators are working under pressure ranging from 300 to 5,000 pounds. They are manufactured by Henry R. Worthington of New York.

American Steam Pump Co., Battle Creek, Mich., says its business for the past two months has been equal to that of the corresponding period of 1903. Since the first of July inquiries have greatly increased, and the company believes there will be a steady demand from now on from both foreign and domestic customers.

The Standard Steel Car Co., Pittsburg, has received an order from the Baltimore & Ohio railroad for 1,000 40-foot drop end gondolas. The cars are to be delivered in October and November.

Trade with the Union Steam Pump Co., Battle Creek, Mich., has kept up remarkably well all year, and it looks for a continuance of these conditions during the winter.

The Standard Chain Co., Pittsburg, has reduced its capital stock from $3,000,000 to $800,700. Each six shares of former common stock has received one share of the new common and for each fourteen shares of the old preferred one share of common and seven of the new preferred have been issued.

No agreement was reached at the conference held last week at Chicago between the bar iron conference committee of the Amalgamated Association and the Republic Iron & Steel Co., the last session having been held on Friday, Aug. 26. It is probable that the board of conciliation, two members of which have already been appointed, will attempt to adjust the differences in the near future.

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SEPTEMBER 1, 1904

THE ARISTOCRACY OF ROLLING MILL LABOR.

In its long history the Amalgamated Association of Iron, Steel and Tin Workers has never made so open an admission that it considers itself the aristocracy of labor as that which runs all through a statement made by one of its officials at Pittsburg a few days ago. The statement is the more significant in that it is clearly made in perfect candor. It is intended for rebuttal of the statement of the Carnegie Steel Co. regarding the situation at Girard and other Youngstown district points where the company desires to put in force a new scale for rolling steel.

The company had stated that in the four plants concerned the number of men affected by the cut was 155 out of total employes of 2,150. The Amalgamated Association rejoinder to this declaration is that the company "fails to state" that fully 85 percent of those not affected are men who are paid by the day, such as "laborers, clerks and others." The verbal accuracy of the presentation of fact by either side is not and cannot be questioned, and the admission is plain by the Amalgamated Association that it assumes to possess a right of aristocracy by which it may close these plants and endeavor to keep them closed until the company agrees to pay the desired wages. It prides itself on its self-restraint in endeavoring to avoid actually breaking the peace and confining its efforts to strenuous moral suasion upon men who have voluntarily undertaken railway journeys that they may work in these plants at wages entirely satisfactory to themselves.

No rights are admitted to belong to the 85 percent of employes by this aristocracy. These men do not belong to the Amalgamated Association. They neither desire membership nor would they be given it if they applied. What a clamor would be raised if they endeavored to show that they had rights by going into a court of law and asking that the 15 percent be enjoined from their endeavor to prevent the operation of these plants! Of the question with which the 15 percent contend they have nothing to do, all they know is that certain men, who have no legal title to exclusive employment, are endeavoring to exert a wholly unsought influence over other men, to keep them from engaging in employment which they have already accepted and in which they would otherwise willingly continue. In so far as the 15 percent meet with success the 85 percent are kept out of their employment. Would the latter have no standing in court?

The aristocracy undoubtedly thinks not, since it goes a step further and arrogantly claims that they have no standing even in the court of public opinion. Its criticism of the statement of the Carnegie Steel Co., which was made purely for the information of the general public, is in substance that the Carnegie Steel Co. "fails to state" that the 85 percent are men not eligible to membership among the aristocracy—hence their involuntary idleness is no fit cause for public sympathy. Surely the Carnegie Steel Co.'s statement would have been stronger from a public point of view had the criticised omission not been made.

Another portion of this criticism which fails to criticise says that the Carnegie Steel Co.'s statement "fails to state that the proposition destroys every vestige of the scales governing finishing mills in which scales have been in existence since the formation of the Amalgamated Association, and upon which the association is founded," and these words again show the falseness of the Amalgamated Association's position. If the scales are such as have been in existence since the Amalgamated Association was formed it is high time that they were destroyed. In the year the association was formed, and for several years thereafter, the material rolled in mills similar to those in question was iron exclusively, except for a very small tonnage of high carbon steel, as much more difficult to work than iron as the mild steel of today which the Carnegie Steel Co. seeks to have rolled is easier to work than iron. It is a startling confession on the part of the Amalgamated Association to demand that it be rolled on the iron scale and to put forth the age of the scale as a reason why it should be maintained.

With the same men and the same equipment, a much greater tonnage of steel than of iron can be turned out, and with less exertion and skill. The Amalgamated Association cannot deny this and does not when put to the crucial test. In past years it steadfastly refused to accede to the repeated demands of sheet manufacturers that the 10 percent advance for rolling steel over iron be eliminated, but when a reduction in the sheet scale became inevitable, within the past year, it readily reduced steel to the iron basis and left the latter unchanged.

A POINT IN PATENT LAW.

One of the results of even an unsuccessful application for a patent is a stock of information of more or less value to the applicant. It is well settled as a general rule that when the claims of an application are rejected all the grounds of rejection shall be given in order that the case may be disposed of later on a single appeal. In doing this the examiner may take one of two courses. He may consider the prior state of the art and review it as bearing on the question of patentability. If he has grave doubts about the invention being reduced to practice he can require the applicant to submit a working model or make other demonstration of the scheme in some mechanical form. The latter would increase considerably the expense of the

patent and to this many inventors would object. The former course would doubtless be more welcome to an applicant and in some cases would be an easy and inexpensive means of securing technical information.

An application for a patent may, for example, be based on a direct contradiction of the fundamental laws of mechanics. In that event a request for a working demonstration by the inventor would settle the matter as thoroughly as could be expected by any method. A persistent inventor, however, would not be supposed to rest content with any such shelving of the application and would seek for further light from Washington in the way of citations from technical history. Such a case has developed in a patent application for a water power apparatus which was in the eye of the examiner a perpetual-motion machine. He called upon the inventor for a practical demonstration but was met with the request that "the claims be examined upon their merits." Thereupon the examiner summarily rejected the claims and in his official letter said he

must decline to examine the claims upon the merits in the sense of making a systematic search into the novelty of each and giving treatment accordingly. The question involved in perpetual-motion machines is sui generis, and not one of ordinary inoperativeness. In the latter case it is often a question of opinion, or of the proportions, arrangement or structure of details; that is, there is room for doubt or for correction. In the present case, however, if the apparatus be operative, perpetual motion is presented. Perpetual motion being impossible, room for doubt as to inoperativeness is not perceived. Time spent in such searches and treatment as would be involved in complying with applicant's request would, in the firmest opinion of the examiner, be thrown away.

This was the examiner's final decision and the case was carried to higher authority. The Commissioner of Patents held that the examiner was right in refusing complete action on the merits of the case. The opinion of the commissioner is in part as follows:

It is not to be presumed that an examiner will reject a device as being a claim to a so-called "perpetual-motion" structure without giving the same careful consideration, and when he has reached such conclusion it disposes of the whole case unless his views are found to be untenable. Patents are granted because of the contributions which the inventors are supposed to make to the progress of science and the useful arts. When, therefore, an application is made for a patent on an alleged invention based on principles which run counter to such a well-recognized law as that of the conservation of energy, the patent office is justified in holding that the applicant has not complied with the statutory requirement of showing that his invention is "sufficiently useful and important" to warrant the grant of a patent therefor until he has shown that the invention is capable of operation. Devices of the character under consideration are frequntly quite complicated, and unless an applicant can present some reasonable grounds for his contention that the device will operate it would seem to be a waste of time which the patent office cannot spare to make an examination into the novelty of the same. In other words, when it has been pointed out that the device will not operate because based on a mode of operation contravening well-established principles of science and mechanics, the office is justified in refusing to give the case further consideration on the merits. In those cases, however, where doubts exist as to the operativeness of a device the application should receive full examination. Inoperativeness based on perpetual motion is a very different kind of inoperativeness from that which usually arises in the office, where it is held that a device is inoperative because certain parts thereof are not properly proportioned, or where a pipe which should be perforated is shown closed, or where belts are improperly crossed, or for various other reasons, many of which are merely draftsmen's errors. In these cases where the inoperativeness can obviously be readily overcome full action on the merits should be given.

LITTLE CHANGE IN IRON AND STEEL EXPORTS.

The exports of iron and steel of which tonnage is reported were not quite as heavy in July as in June, the totals being 108,035 tons in July and 156,844 tons in June. The principal items for July were: Pig iron, 4,611 tons; steel rails, 40,300; billets, ingots and blooms, 35,904. The exports of ore were 40,313 tons in July against 5,370 tons in June and 5,398 tons in July, 1903. This increase is due largely to the exporting of high phosphorus ore from New York State. The detailed exports of which tonnage is reported are as follows:

EXPORTS OF IRON AND STEEL FROM THE UNITED STATES—GROSS TONS.

	July		7 mos. end'g July	
	1903	1904	1903	1904
Pig iron	1,739	4,611	9,196	26,324
Scrap	273	3,135	2,579	14,252
Bar iron	309	2,020	12,414	17,418
Wire rods	1,895	770	16,258	8,444
Steel bars (not wire rods)	3,034	850	12,602	14,087
Iron rails	93	4	139	1,382
Steel rails	654	40,300	4,758	174,642
Billets, ingots and blooms	153	35,904	805	208,072
Hoop, band and scroll iron	51	84	1,187	1,918
Iron sheets and plates	1,138	268	2,385	2,664
Steel sheets and plates	501	3,698	7,082	16,717
Tin plates, terne plates and taggers' tin	2	252	165	3,743
Structural material	3,185	4,921	19,145	26,124
Wire	8,422	7,539	62,551	66,992
Cut nails	890	1,371	4,886	6,063
Wire nails	4,434	2,026	18,273	16,843
Other nails, including tacks	163	282	1,295	1,684
Total	26,586	108,035	176,300	607,324

The value of exports, excluding ore, but including machinery and other items of which the tonnage is not returned, was $9,990,247 last July as compared with $9,021,668 in July, 1903. The difference in values is not commensurate with the tonnage on account of the lower prices prevailing this year. For the seven months, the values were: $70,984,791 in 1904 and $57,103,491 in 1903.

Imports of which tonnage is returned have declined from 26,091 tons in June to 21,857 in July, compared with 90,050 tons in uly, 1903. The tonnage table of imports on articles named follows:

IMPORTS OF IRON AND STEEL TO THE UNITED STATES—GROSS TONS.

	July		7 mos. ending July	
	1903	1904	1903	1904
Pig iron	28,046	4,000	490,497	48,102
Scrap	3,588	314	66,475	8,894
Bar iron	3,465	3,114	26,097	13,110
Iron and steel rails	3,086	3,581	75,730	34,028
Hoop, band or scroll	226	265	893	1,233
Steel ingots, slabs, billets or bars	33,070	879	209,300	7,492
Sheets and plates	1,154	156	5,636	3,281
Tin and terne plates	5,178	7,341	30,656	42,114
Wire rods	1,626	1,428	12,031	9,515
Wire and wire articles	611	394	2,893	2,552
Structural shapes	.....	355	.....	5,900
Total	90,050	21,857	929,208	176,121

The total value of imports of iron and steel, excluding ore, but including a number of lines in which tonnage is not ascertainable, was: $1,905,806 in July, 1904, and $3,529,676 in July, 1903. The values for the seven months were: $12,998,003 in 1904 and $28,849,425 in 1903.

One of the magazines deals with the races at Ostend and figures are given to show that the automobilists flew over the ground at speeds in the neighborhood of one hundred miles per hour. In fact the assertion is made that Rigolly on a Gobron-Brillié car covered the kilometer race at a spurt of 103½ miles to the hour. The course over the "flying kilometer" is but

a trifle over half a mile and is evidently not attempted from a standing start at the mark, but the rate with which the distance is negotiated is nevertheless of astounding rapidity. If the record is beyond dispute then it is a striking commentary upon the training and nerve of the men who engage in these contests. Some doubt may, however, be thrown upon the photographs which are claimed to show the intrepid winner of the fast race during his passage past the camera. The wheels are twisted at various angles peculiar to snapshot photography of moving vehicles. Light is thrown on the old inquiry about the relative speeds of the upper and lower halves of the wheels, by the uniform distinctness of the lower spokes in comparison with the upper and hazy ones. But anyone aware of the difficulties of railroad train photography, the "head on" attempts at "century limited," Empire State express, and others, may reasonably doubt the success of snatching a picture from an object traveling at over 103 miles per hour. It is difficult, however, to say what cannot be done with photographic any more than automobile mechanism.

The Western Machinery Market.

OFFICE OF *The Iron Trade Review*,
1164 MONADNOCK BLOCK, Aug. 31.

The turning point in the machinery trade seems to be at hand, and the prospects are that the last four months of the year will witness a greater activity than has been seen thus far. Since July 1 inquiries for machinery have been very plentiful, all firms reporting a marked increase in this department. Labor troubles are being adjusted more and more on a basis satisfactory to employers, and with this evil out of the way, good crops assured, and a safe president, whichever party wins at the polls, it is argued that there is nothing to stand in the way of a return of "good times." We give below a summary of the views of leading machinery manufacturers in the West as to the outlook for trade as gauged by demand for their own product, and the opinions expressed are not only interesting, but valuable as showing the trend of thought among business men.

Henry E. Pridmore, Chicago, reports that the most noticeable feature in his business of the past few months is the decided tendency towards the use of molding machines for the manufacture of large castings. He says it has been the belief among a number of people that molding machines were adapted only to light castings—not over three or four feet in length or diameter—whereas some of the most successful machines in operation are being used on heavy work. Several firms that have held this view are now figuring with Mr. Pridmore, two contracts being mentioned as pending for machines of special design, one lot of which will be 5 feet 6 inches in diameter, and the other 20 feet long. Demand for the smaller class of machines has also been excellent in the past month, among the contracts closed being six from manufacturers of heating apparatus, five for steam pump work and four orders from agricultural implement makers, one of the latter being for 34 machines. There has been excellent inquiry from the South, cotton machinery shops being particularly mentioned, while the demand from railroads has been correspondingly active. Export orders have shown an improvement, especially from South America.

Armstrong Bros. Tool Co., Chicago, advises us that its business continues very satisfactory, although it does not anticipate any marked improvement before January. The export trade is particularly satisfactory, showing a steady and healthy increase, orders now being received weekly from all parts of the world. The company is preparing to put on the market several new specialties, and in anticipation of a brisk demand for these is improving its plant in several minor details as well as accumulating some stock ahead.

D. O. James, who was formerly a member of the firm of James & Foote, cut gear manufacturers, whose plant at 58 and 60 South Canal street, Chicago, was destroyed by fire on June 8, has sold his interest in the tools and machinery taken from that fire to Mr. Foote, and has started in business for himself. Mr. James has leased the entire second floor at 35 and 37 South Canal street, having over 5,000 feet of floor space, and has put in improved machinery for making spur gears, bevel gears with planed teeth, internal gears, spiral and worm gears, etc. The new equipment includes a Gleason gear planer, Gould & Eberhardt's gear cutting machine, Fellows' gear shaper, Cincinnati milling machines, Colburn boring and turning mills, Baker's keyseating machine, etc. Mr. James has had a long experience in gear cutting, having been continuously engaged in this line of work since 1888.

The Link-Belt Machinery Co., Chicago, states that the demand for its machinery shows no material diminution, and that prospects for a satisfactory winter's business are very good. The company has recently completed extensive additions to its plant and equipment, and nothing further in this direction is contemplated in the near future.

Hanna Engineering Works, Chicago, which recently placed on the market the Hanna pneumatic yoke riveter, says it has been successful in the sale of this machine, orders for six of them having been taken in the last month. A large number of inquiries have also been received, many of which are expected to develop into orders in the near future.

George Whiting Co., Chicago, manufacturer of punching and shearing machinery, sums up the business situation from the standpoint of demand for its own tools, in the brief statement that trade is excellent, collections good, prospects fine for the future, and that it needs additional equipment for its plant to meet increasing orders.

Marinette Gas Engine Co., Chicago Heights, Ill., in reviewing the business conditions of the past few months, says that while trade has not been as good as it might be, the company has not noticed the depression to the degree others have because of the extra work involved in connection with organzing and equipping its new plant. This in addition to the orders booked has kept an ordinary working force busy all through the spring and summer. The company is now in excellent shape to handle a much larger business than it has ever had, and judging from inquiries received from all parts of the United States, as well as from Canada and Mexico and other foreign countries, it believes there will be a revival soon for the class of machinery it has long made a specialty. The company is making an engine especially designed for service in connection with pumping and electrical power plants, a need which has been felt for some time. Among the shipments made in the past week, were five complete outfits, including engines and generators direct connected for Portugal; two 80-h. p. engine to Arizona; two 50-h. p. and one 75-h. p. engines to Cleveland; two 50, two 75 and one 100-h. p. engine for Pittsburg. A number of orders for engines ranging in size as above have also been booked for delivery within the next four to six weeks, including a Government contract for the installation of a 75-h. p. engine direct connected to generator to be installed at Fort Hamilton, N. Y. The company has recently placed a number of new tools in its factory, among which is a 72 x 72-16 ft. Niles planer with four working heads, weighing 72,000 lb., this being a tool especially designed for handling the work on larger engines.

Charter Gas Engine Co., Sterling, Ill., has had a fair run of business in the summer months. A good fall trade is anticipated after the crops are assured and the political campaign over. The company is now putting on the market a combined Charter gas engine and dynamo on the same base direct connected, also a cheap engine for agricultural work called the "Sterling."

Wilcox Mfg. Co., Aurora, Ill., manufacturer of steel carrying track systems and hardware specialties, reports that its business this year shows a healthy increase in all departments over the volume of sales of 1903. Although 12,00 square feet of floor space were added to the factory about eight months ago, President Simpson says it is more than probable they will have to enlarge the shops further in another year.

Bignall & Keeler Mfg. Co., Edwardsville, Ill., says the demand for pipe threading and cutting machinery has been

normal in the past month. Inquiries are steady and from good parties, and the company looks for an improvement in business during the coming fall and spring.

Moline Tool Co., Moline, Ill., reports a marked increase in the inquiries for gang drills and boring machines, and particularly for special machinery from the various local implement manufacturers.

Barnard & Leas Mfg. Co., Moline, Ill., has a large consignment of flour mill machinery ready for shipment to Shanghai, China. The company has found business brisk all year, although orders have been largely for small work. Within the last thirty days, however, these have shown a falling off, and it is expected that during the balance of the year trade will be light.

Gardner Governor Co., Quincy, Ill., reports that it is operating its shops to full capacity, though business is not as brisk at this plant as a year ago. The officials of the company look for a continued good demand all through the winter.

Williams, White & Co., Moline, Ill., manufacturers of bulldozers and punching and shearing machinery, say that trade has the appearance of improving somewhat, though they find it good in some lines and bad in others.

Ransom Mfg. Co., Oshkosh, Wis., has found orders scarce during the past month, but inquiries were in good volume. The company's confidence in the future is firm, and in the interim it is busy improving its machines, rearranging its plant and adding new tools in anticipation of a greater demand.

Curtis & Co. Mfg. Co., St. Louis, looks for an improvement in business conditions after the election, and believes that next spring will see a general revival of trade throughout the country. July and August were the two dullest months of the year, but not unusually so for this period of the year. The falling off was felt more in the pneumatic machinery department, in which its Eastern and Northern trade suffered principally. The demand for saw mill machinery throughout the South and West has been active. The company recently purchased a new tract of land on which it proposes to erect its new shops next spring. These will include foundry, machine shop, wood-working shop, pattern shop and warehouse. In the year following a new saw factory will be erected.

Minneapolis Steel & Machinery Co., Minneapolis, Minn., reports that its bridge and structural steel departments have been running night and day continuously up to the present time. It notes a falling off in this class of work, however, in the last few weeks, and says it is problematical whether the plant will operate double time during the winter. In its engine and machinery departments, the company has found business quiet and no improvement is expected until crop conditions are determined. These are a matter of concern to manufacturers in the Northwest on account of the reports that in many districts the wheat has been ruined by rust. Should the yield prove better than present indications seem to determine business might revive; if not, the company looks for a quiet winter. Money is easy and collections good, but consumers are apparently pursuing a waiting attitude. In its foreign trade the company has a fair business, having recently secured a contract for a Corliss engine and a complete power plant for shipment to Shanghai, China.

American Hoist & Derrick Co., St. Paul, Minn., advises us that the demand for hoisting equipment in connection with construction work is fairly active; while for excavating machinery, the indications are that present conditions will continue at least during the immediate future

Crawford & McCrimmon Co., Brazil, Ind., manufacturer of mining machinery, reports that its trade has fallen off somewhat as compared with the volume of business transacted last year. It has confidence in the situation, however, and thinks that better conditions will prevail the coming fall and winter.

S. Freeman & Sons Mfg. Co., Racine, Wis., states that its boiler trade has improved considerably in the past month, and it looks for a good trade this winter. Among some of the recent contracts taken, is one from the Horlick Food Co., Racine, Wis., for four 335-h. p. internally fired, corrugated furnace boilers with all fixtures and fittings complete; another for a boiler of similar type, 9 feet x 12 feet from the Portland Gas Co., Portland, Oregon; an order from Abner Doble Co., San Francisco, Cal., for two 9 foot 6 inch x 14 foot Morrison boilers; also from N. R. Allen's Sons, Kenosha, Wis., for two 72 inch x 19 foot horizontal tubular boilers. An order has also been received from the Union Electric Co., Dubuque, Iowa, for a self supporting smoke stack 13½ feet in diameter x 200 feet high. In its implement department the company says trade has improved materially. Orders for a carload of wind mills have been received from New Zealand, as well as a substantial order for this class of machinery from Finland. If the corn crop in the Western States matures, as now expected, the company looks for a good demand for its corn sheller.

The H. N. Strait Mfg. Co., Kansas City, Kan., reports that its shops are reasonably busy on orders from territory east of the Mississippi river. Business in the West is none too promising, the company says, owing to the confusion of labor troubles, national politics and the probability of poor crops. No improvement is looked for in trade next spring.

The Riverside Iron Works Co., Kansas City, Kan., has received an order from Liverpool, England, for a can stuffing machine. Through its Chicago office it has also booked several orders for vacuum pumps and machines, two of these being for foreign shipment. In addition, it has closed contracts for a 14 x 24 direct connected hoisting engine, together with two 14-foot direct connected fans for Northern Missouri. Considerable business is being figured on from the South, as well as from Russia.

Oliver Machinery Co., Grand Rapids, Mich., manufacturer of pattern shop equipment and wood working machinery, has had an active trade in the past month, having closed up a lot of business which has been hanging fire since the first of the year. While several of these orders were for complete outfits, the greater number were for single machines of the more expensive type intended to replace tools of older date and pattern. The company finds trade with railroads materially increasing, which it takes as a gratifying sign of greater confidence and improved conditions.

Nordberg Mfg. Co., Milwaukee, Wis., is optimistic as to the outlook. Orders that have been in abeyance several months or more are being placed and others are getting ready to buy in the near future. The company is of the opinion that good times are coming again soon.

New Doty Mfg. Co., Janesville, Wis., manufacturer of punching and shearing machinery, advises us that its business has been dull all summer, although it has had enough work for a full crew of men. Inquiries have been more numerous in the last few weeks than before, although as yet no business has developed from them.

Hathorn Foundry & Machine Co., Mason City, Iowa, reports that the prospects for fall trade are bright, inquiries having gradually increased in the past month. Shipments of the Hathorn helve hammer have been recently made to the Standard Oil Co. in New Jersey, as well as to Los Angeles, Cal.

Fox Machine Co., Grand Rapids, Mich., says that it has been getting its share of the business going during the dull period that has prevailed. Inquiries have been better of late, and a sharp improvement is looked for this fall. It believes there will be a greater demand next year when the election and holidays are all over. The company has recently completed a dock wall on the river frontage of its property, on which it proposes to erect a building which will be used for storage, packing and shipping purposes.

National Machinery Co., Milwaukee, Wis., manufacturer of speed lathes and gasoline engines, says that while inquiries for new tools and engines are plentiful, it has been slow work developing them into orders. Since the first of August its trade has picked up considerably, and the future has a brighter appearance than it has had all year.

Litchfield Foundry & Machine Co., Litchfield, O., has

been busy making improvements and enlargements to its plant. A new Whiting cupola has been installed in the foundry, and new lathes and a 300-ton hydraulic press will be added to the machine shop equipment. The office building has also been enlarged, and a fire-proof vault for keeping engine records put in. The company reports that the demand for engines continues good, and from the regularity of inquiries it looks for a continuance of these conditions.

Great Lakes Engineering Works, Detroit, Mich., through their president, Antonio C. Pessano, report the outlook for winter business very good. More than the average number of inquiries have been received in the past few weeks for machinery, including vertical engines, vertical air compressors of the larger sizes, ice making machinery, as well as marine engines and steel ship construction. Plenty of business is seen ahead, providing labor organizations do not cause another setback.

PERSONAL.

Geo. Whitney, of the auditor's department of the Pennsylvania Steel Co., Steelton, has resigned. Mr. Whitney is a brother of E. E. Whitney, a former auditor of the company who resigned a number of months ago. Mr. Whitney has not announced his plans for the future.

Harry M. Pflager has resigned his position with the American Steel Foundries to accept a position with the Commonwealth Steel Co., of which he was elected vice president at the meeting of the directors on Aug. 22. Mr. Pflager was for many years mechanical superintendent of the Pullman Co., at Chicago, and afterwards vice president of the American Clock Co. at Chicago. He will direct his attention to the sales department and have his headquarters at the Commonwealth Steel Co. offices, in the Bank of Commerce building, St. Louis.

Henry P. Bope, first vice president of the Carnegie Steel Co. and general manager of sales, while continuing actively at the head of that department, has been succeeded by Samuel A. Benner in the capacity of manager of sales. In 1900 Mr. Bope was made assistant sales agent of the Carnegie Steel Co. and in 1901 he was elected first vice president and general manager of sales. Mr. Benner takes up his new work Sept. 1.

Garry B. LeVan, formerly superintendent of the Hall furnace of the Carnegie Steel Co., at Sharon, Pa., has been appointed superintendent of the two stacks of Heckscher Bros. at Sweedland, near Philadelphia, Pa.

J. E. Galvin Jr., has been appointed superintendent of the Pittsburg works of the American Steel Foundries.

P. H. Mynahan, of the Atlanta Steel Hoop Co., Atlanta, Ga., arrived in Pittsburg this week for a short visit to renew his many acquaintances.

Thomas Thompson, foreman melter in the South Sharon, Pa., plant of the Carnegie Steel Co., has resigned to accept the superintendency of the open-hearth department of the Tennessee Coal, Iron & Coke Co., Ensley, Ala.

Henry C. Frick returned from an extended trip to Europe on the Kaiser Wilhelm, arriving in New York on Tuesday, Aug. 30.

John McGean, president of the American Linseed Co., formerly manager of the Rockefeller fleet on the lakes, has been very ill of typhoid fever at Duluth for the past month. His condition is still critical.

Jules Goujon, a prominent iron manufacturer of Moscow, is making an extended visit to the United States, visiting the principal iron and steel plants. He was in Cleveland this week, whence he went to New York. He will later attend the meeting of the American Institute of Mining Engineers at Duluth.

The Broomall Iron & Steel Co., of Belington, W. Va., has been incorporated with $300,000 capital for the purpose of operating a planished steel plant. The company has purchased four sheet mills from Neal Bros., Pittsburg, located in that company's plant on the South Side, which will be removed to Belington. The incorporators of the company are G. C. Broomall, T. C. Perrine, W. P. Edmundson, P. J. Boreman and S. M. Neaso.

The Labor Situation.

CINCINNATI MOLDERS' STRIKE PENDING.

(Special Telegram.)

CINCINNATI, Aug. 31.—A further conference was had on Tuesday between the Foundrymen's Association of Cincinnati and the Iron Molders' Union in regard to the differences now existing. The Foundrymen's Association agreed to restore the reduction in wages from Aug. 15 to Sept. 1, in order to be in conformity with the molders' claim that the New York agreement requires 30 days' notice of a reduction in wages. What the situation will be after Sept. 1 is not made clear. Iron Molders' Union No. 4 of Cincinnati and No. 20 of Covington held a joint meeting last evening. The foundrymen's proposition for a reduction in wages Sept. 1 was rejected. The union submitted two propositions to the foundrymen—one that the same rate of wages be paid as prevailed last year, the same shop conditions and a ten-hour day; the other accepting the wages offered by foundrymen provided a nine-hour day is granted. The foundrymen are given until Sept. 3 to act. If neither proposition is accepted the molders will declare a strike in shops which have posted notices of reduction. It is believed by the molders that some of the larger shops will favor the acceptance of the nine-hour day proposition.

STEEL CORPORATION AND AMALGAMATED.

The Republic works of the National Tube Co., South Side, Pittsburg, resumed operations in full this week on a non-union basis, most of the former Amalgamated Association employes returning to work. A strike was declared against this plant some time ago by the Amalgamated Association, but a settlement was effected with the men and the plant is operating as an open mill. The loss of this plant is another severe blow to the Amalgamated Association, as it was the last plant of that company over which it had jurisdiction. Last year the association declared a strike at the Frankstown plant of that company, which was also lost. The United States Steel Corporation is fast getting free of Amalgamated Association rule in the mills of the subsidiary companies. During the strike three years ago the association lost its control in the mills of the Illinois Steel Co., and the strike in the mills of the American Steel Hoop Co., department of the Carnegie Steel Co., at Youngstown and Girard is already practically lost, as the upper plant at the former place is on in full, while at Girard two of the three mills are in operation. The association's strength now lies in the sheet and tin mills of the American Sheet & Tin Plate Co., and in the sheet department the most economically operated plants are on a non-union basis.

THE CARNEGIE HOOP MILL STRIKE.

Regarding the strike at the American Steel Hoop mills of the Carnegie Steel Co., at Girard and Youngstown, O., the officials of that company last week issued the following statement: "There are 2,150 men employed in the mills affected by the proposed cut. These mills are as follows: Warren, Girard and upper and lower Union at Youngstown. Of this total number but 155 men's wages are reduced, leaving 1,995 out of 2,150 not affected. Four classes of workmen are concerned, viz., rollers, heaters, roughers and rundowns, the proposed reduction being: Total employes, 2,150; 1 man, 71 percent; 11 men, 43 percent; 11 men, 27 percent; 30 men, 40 percent; 72 men, 35 percent; 30 men, 25 percent. One hundred and fifty-five men affected. One thousand nine hundred and ninety-five men not affected. Note should be made of the fact that the wage change affects only work on steel. For puddling and finishing iron the company offered to pay Amalgamated Association scale prices. Seven percent of the total employes are reduced, and, with the cut in force, the range of wages for these employes will be from $3 to $15 per day."

A comparison of the wages of the men employed on the 16-inch mill at Girard, O., with what the company wants them to accept is as follows:

Roller—Old rate, 65.7c; proposed rate, 22.5c.

First assistant—Old rate, 12c; proposed rate, 7.2c.

Second assistant—Old rate, 10c; proposed rate, $4.50 a day.

Night roller—Old rate, 32.75c; proposed rate, 15c.
First assistant—Old rate, 10c; proposed rate, 6c.
Rougher (down)—Old rate, 10c; proposed rate, 7.5c.
Rougher (up)—Old rate, 17c; proposed rate, 7.5c.
Middleman—Old rate, about 12.8c; proposed rate, 7.5c.
Catcher—Old rate, 5% of 65.5c (company pays); proposed rate, 9.5c.
Helper—Old rate, 7.86c; proposed rate, 6c.
Rundown (divided between two)—Old rate, 23c; proposed rate, 7.5c.
First hooker-up—Old rate, 8.6c; proposed rate, 6c.
Second hooker-up—Old rate, 6.75c; proposed rate, 5.5c.
Dragout—Old rate, 6.75c; proposed rate, 5.5c.
Heater—Old rate, 65.5c; proposed rate, 13c.
Helper—Old rate, $4 a day (about); proposed rate, 6c.
Hooker (down)—Old rate, $1.75 per day; proposed rate, 3.5c.

This schedule is based on a 30-ton mill (per turn) and under the present base rate of 1.3 cents as the selling price of bar iron. This would give the roller something like $13.75 a day, making in the wages which he received before a cut of something like 50 percent or more.

M. F. Tighe, secretary of the Amalgamated Association, has made the following reply to the company's statement: "Number of plants of Carnegie Steel Co. affected by the reduction of wages, now under Amalgamated scale, four. Number of independent plants which would be affected by the reduction, 80. Amount of total tonnage of iron produced by Carnegie plants, 10 percent. Amount of total tonnage of steel produced by Carnegie plants, 90 percent. They agree to pay Amalgamated scale on 10 percent of product, asking a reduction of wages ranging from 28 to 71 percent on 90 percent of product. They claim that only 155 men are affected out of a total number of 2,150, but they fail to state that fully 85 percent of those not affected are men who are paid by the day, such as laborers, clerks and others whose wages are now such that any reduction would be impossible. They fail to state that the 85 percent mentioned have to depend entirely for their employment on the number mentioned as being affected by the reduction. They fail to state that their proposition destroys every vestige of the scales governing finishing mills in which scales have been in existence since the formation of the Amalgamated Association, and upon which the association is founded. Their statement is elusive, deceptive and not in accordance with the facts, as it tries to make it appear that they are generously providing for 1,995 employes out of a total of 2,150 without making it plain that the larger number do not belong to the association nor are affected by the provisions of the association scale."

NEW YORK STRIKE DEVELOPMENTS.

The Labor Day committees of the various unions in the New York Building Trades Alliance announced last week that Philip Weinseimer had been selected to lead the Labor Day parade on Sept. 5. It was the intention to "vindicate" Weinseimer as Sam Parks was vindicated last year, but last Monday Weinseimer, who is now under two indictments for extortion, resigned as president of the Building Trades Alliance and his resignation was accepted. District Attorney Jerome has decided that there is no basis for a criminal proceeding in the charges laid before him by counsel for Weinseimer. The information submitted to the district attorney alleged that a criminal conspiracy existed between the association of employing tile layers and the journeymen and that the Building Trades Employers' Association had raised a fund of $20,000 to "railroad" Weinseimer.

NATIONAL METAL TRADES ASSOCIATION.

CINCINNATI, Aug. 30.—W. J. Gilthorpe, grand secretary-treasurer of the Brotherhood of Boiler Makers and Iron Shipbuilders, has issued an official letter to the members of the brotherhood, wherein he states that the large number of strikes in which the brotherhood is engaged and the inadequacy of the present resources to meet the demands, have compelled him to request the council to recommend a remedy. He says that thirty-five boiler makers' lodges and fourteen helpers' lodges are on strike, and that he has in his office awaiting payment demands of 3,113 boiler makers and 818 helpers and that these demands will require $24,427 to pay them. He further states that inasmuch as the council approved the strikes it must get money to pay the strikers. In reply to this letter the council directed the grand secretary-treasurer to submit to the lodges for their approval a proposition to amend the constitution of the grand and subordinate lodges increasing the dues. This will be voted upon by the lodges.

The International Association of Machinists has just issued its annual report, from which the following extracts were made:

Total number lodges organized April 1, 1903, to July 1, 1904	117
Total number members admitted by charter	3,000
Total number lodges disbanded	6
Total number of members	70,000

The union reports that it now has working agreements with nearly every important railway in the United States and Canada, with the exception of the Santa Fe road. During the past fifteen months the union has been involved in 202 strikes and lockouts, divided as follows:

For a shorter work day	27
Against introduction of two machine piece work and premium system	18
Against reduction of wages	19
Lockouts	19
Increased wages	34
Against increased hours of labor	4
For signed agreement	28
Refusing to work on "unfair" articles	14
Against open shop	11
AgainstAgainst open shop	11
Refusal to restore wages	1
Miscellaneous	8

This report gives a detailed statement of the expense of several strikes, including the strike of last summer against the New York Metal Trades Association, which cost the International Association of Machinists $23,000.

The situation in the struck machine shops in Chicago is such that the commissioner and secretary of the N. M. T. A. are arranging to close their temporary office in that city.

The strike of the iron molders of the Wellman-Seaver-Morgan Co., Akron, O., which has been on since the middle of January, has been declared off, the employes returning to work on the company's terms.

The Rogers Locomotive Works, Paterson, N. J., employing 12,000 men, have posted a notice of a 10 percent reduction in wages to take effect Sept. 1.

The Allegheny Steel & Iron Co., Pittsburg, whose plant is located at Avenue, Pa., has already placed a contract for the installation of a 72-inch plate mill. In addition to plates skelp will also be rolled. This company already operates its own open-hearth plant, and it is probable that this will be extended.

The Standard Tin Plate Co., Canonsburg, Pa., is sending to the trade neat samples of three grades of its coke plates. One of the samples is that of the Pecon best cokes, another is that of Pecon extra cokes, carrying a little less metal than the Pecon best cokes, while the sample of Pecon cokes is that of the company's regular coke plates. In addition to these grades of coke plates, the company manufactures charcoal bright plates of regular grades from 3 pounds to 7 pounds coating per base box, also a full line of terne roofing plates in coatings to suit the requirements of the buyers. A specialty of black plate is also made. The officers of the company are Joseph Underwood, president; W. H. Richards, general manager; J. V. H. Cook, treasurer; and Louis Follet, secretary.

The *Obermayer Bulletin*, as indicated in its last issue, will be published hereafter from the Pittsburg office of the S. Obermayer Co. This publication, which now consists of 28 pages, 6 x 8½ inches, is intended to be a trade barometer and information bureau for foundrymen.

The Rankin, Pa., plant of the American Steel & Wire Co. resumed operations this week after an idleness of nearly a month. The new nail mill, which is to replace the plant destroyed by fire, is fast nearing completion and will be placed in operation in about a month.

STEEL MEETINGS AT NEW YORK.

(Special Telegram.)

NEW YORK, Aug. 31.—The representatives of companies producing structural steel were in conference today and it is understood an adjournment was taken until Monday. A preliminary conference held yesterday resulted in a proposal under which the Lackawanna Steel Co. can get a proper share of structural business and it is understood that company has the matter under advisement. Prices of shapes and of plates and billets are under discussion, some interests favoring reductions in all—as much as $7 being proposed on structural material by some manufacturers. There is quite a little diversity of opinion. While reductions are generally looked for it is not at all certain that such action will be taken.

The Eastern Machinery Market.

OFFICE OF *The Iron Trade Review*,
ROOM 1315, No. 150 NASSAU ST., Aug. 31.

The machinery market in this vicinity during the month now closing brought about no important new developments as August is always the chief vacation month of the year. Every machinery house visited told the same tale about some good business being in sight, but the orders for which were held back pending the absence of some one in authority from the city. In the matter of inquiries the month was not as brisk as July, and the same reason is advanced. So taking the month all in all, it does not admit of as cheerful a resume as July.

Machine tool men found the most fault with recent conditions. At the opening of the month they had high hopes that the railroads would be found making heavy purchases, but the month closes with many good propositions still far from the order stage. It was thought that the Pennsylvania railroad would purchase a goodly portion of the $1,000,000 worth of machine tools for which it is known to have specifications prepared, but as far as can be learned the company has expended only an insignificant sum in this direction. In some well-informed quarters the belief is expressed that purchases will be made on the basis of a few tools at a time. This was foreshadowed in *The Iron Trade Review* a few weeks ago, and recent developments have confirmed it. Machine tool men are still waiting to hear from the Philadelphia & Reading, and the Erie railroads, which are known to be in the market for a good quantity of machine tools, but up to this writing the companies have not placed any orders, at least of a substantial character.

As for the general machine tool situation the month passes with a fair business having been done. Inquiries were a little backward, if anything, with many firms not making much of an effort to get orders, believing vacation conditions made it unnecessary. Here and there are complaints that business is being taken at the expense of prices. It is difficult, if not impossible, to find conclusive evidence of cutting, although it is not denied that occasionally a sale is made on which concessions are granted. One very well known house having a large stock of tools on hand is said to be quoting prices much lower than those which generally prevail. Competitors report the loss of several good orders in consequence.

In engines and boilers general business conditions showed little change over July. From the standpoint of orders the month was anything but notable. There were a few large contracts placed, but the kind of trade in which everybody manages to get a share, was conspicuous by its absence. The building strike in this city during the past few weeks was especially felt by those who make a specialty of engines adapted for apartment structures, and practically no business of this kind has been closed in weeks. Orders for engines for manufacturing purposes were few and far between also. Closing could hardly be any slower than it was. Inquiries showed a slight improvement over March, but nothing of any particular promise was contained in them. Rumors of prices being cut are still going the rounds. It is conceded that some contracts have been closed recently at figures attractive to the buyer. Some manufacturers of engines, seeing the fall approach with no general awakening in trade, are reducing their working forces. One Central New York concern, employing all the way from 150 to 300 hands, according to business conditions, is said to have closed down indefinitely. In boilers only fair activity has prevailed. Manufacturers say closing is very bad, and inquiries only fairly satisfactory.

Electrical machinery business in August was fairly good. The orders have been confined for the most part to small equipment, in which prices have shown some weakness, the old charge that the large companies have quite a stock of this on hand, and are disposing it at low prices, being frequently made. Trade has suffered very severely from the building strike in this city. Inquiries came in pretty regularly, but complaints were plentiful as to poor closing. In power transmitting machinery, wood working machinery, and engineers', machinists', contractors', and railroad supplies, the month has been without particular interest, trade as a rule being along normal lines.

The foreign machinery trade during the past month was very brisk, when compared with the few months previous. Machine tool men made some substantial sales, especially for shipment to Germany, where improving industrial conditions are resulting in increasing inquiries for machinery.

The Niles-Bement-Pond Co. booked some very good business during the present month, especially from railroad sources. The company finds evidences of some good trade in sight, with uncertainty as to closing a marked feature. Its inquiries showed a gratifying increase.

The Prentiss Tool & Supply Co. noted nothing exceptional in its business during the past month its orders being about the same in the aggregate as those it has booked during the past few months. It reports manufacturing interests more disposed to purchase than they have been.

Hill, Clarke & Co. express themselves as pleased with their past month's business. They booked some good orders, and found inquiries came in pretty regularly.

Manning, Maxwell & Moore say their August trade compared very favorably with their July business, which was exceptionally good. They take a most optimistic view of the outlook, and believe that the approaching election will continue to have less and less an adverse influence on trade in general.

Vandyck-Churchill Co. says it booked more orders during the past month than in any month since March. It finds the character of inquiries getting better.

The local office of the Hooven, Owens, Rentschler Co. booked some good orders recently, the most important being one for three 160-h. p. engines for the Varick Realty Co.'s building, in this city. The company finds a disposition to defer closing on a large amount of business.

E. N. Ludeman, who represents several large engine interests, notes a goodly increase in the number of his orders during the past month, the largest being one for a 750-h. p. Robert Wetherell & Co.'s engine, from the Barber Linen & Thread Co., Paterson, N. J. The Nicholson File Co. in the same city, is said to have closed the contract for the 800-h. p. engine, for which it has been in the market.

Thayer & Co. Inc., manufacturers of steam boilers, report trade in their line to be without particular feature. Their business during the past month was very satisfactory. They note some good propositions in sight, but find it difficult to get an inkling as to when they will develop into orders.

The Crocker-Wheeler Co. did a very satisfactory business during the present month, with small electrical equipment mostly in demand. It is inclined to take a very hopeful view of the outlook.

The American Wood Working Machinery Co. finds its line in better request now than in some weeks past. Its August business showed a slight improvement over that booked during July.

The Geo. V. Cresson Co. and A. & F. Brown Co., manufacturers of power transmitting machinery, find evidence of improvement. Both report many projects under consideration, which would mean some excellent orders in their porducts.

The Pierce blast furnace at Sharpsville, Pa., will be blown in next week. It has been idle for several months.

SPECIAL MACHINE FOR INJECTOR PARTS.

The Beaman & Smith Co., of Providence, R. I., has designed and built a special machine for the plant of the Hancock Inspirator Co. at Boston. A general view of the machine is presented by the halftone, Fig. 1, and more detailed showing of the parts is given by the drawing reproduction in Fig. 2.

The main spindle is driven by a 4-inch belt on a four-section cone. This acts through spur gearing in the ratios of 3 and 7½ to 1. Connection is made by means of a friction operated by a lever conveniently placed for the operator. The shaft is hollow and carries a steel rod with hardened ends reaching from the rear of the taper hole to one inch beyond the back end. In order to remove the tools the spindle is moved back allowing the rod in it to strike the adjustable abutment which is securely fastened at the outer end of the spindle slide.

The rotating table is 18 inches diameter and has T-slots for fastening work or holding fixtures. In the outer edge of the table are four holes for an index pin. The table rotates on a bronze ring, which is adjustable for wear, and is securely attached to the cross table by a dovetailed ring closed by a cam. This is illustrated in the detail view seen in Fig. 2. The table has a cross movement of 14 inches, 7 inches each side of the center of spindle and has a movement of 26 inches parallel with axis of main spindle.

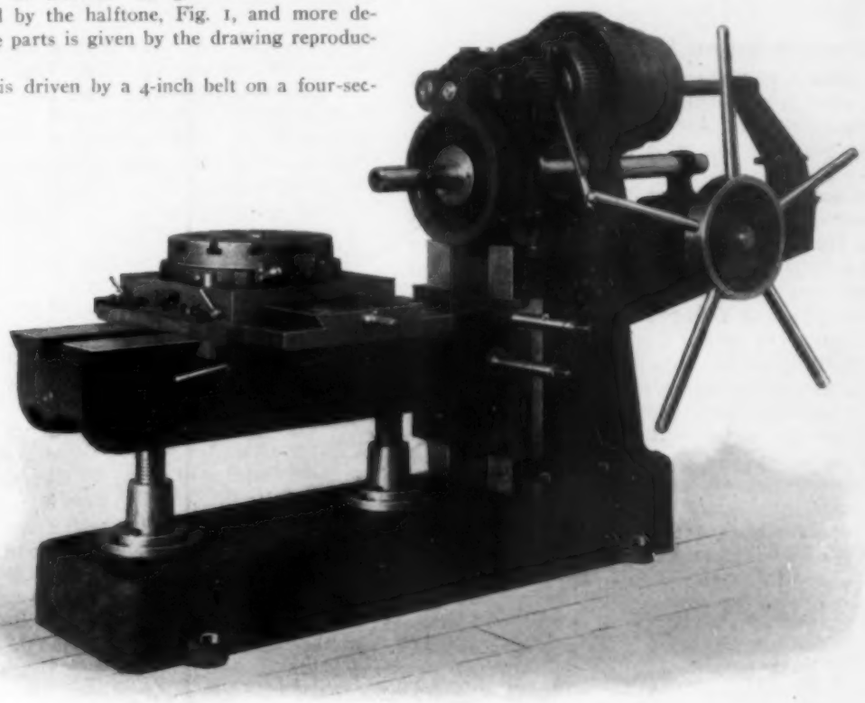


FIG. 1.—SPECIAL MACHINE DESIGNED BY THE BEAMAN & SMITH CO.

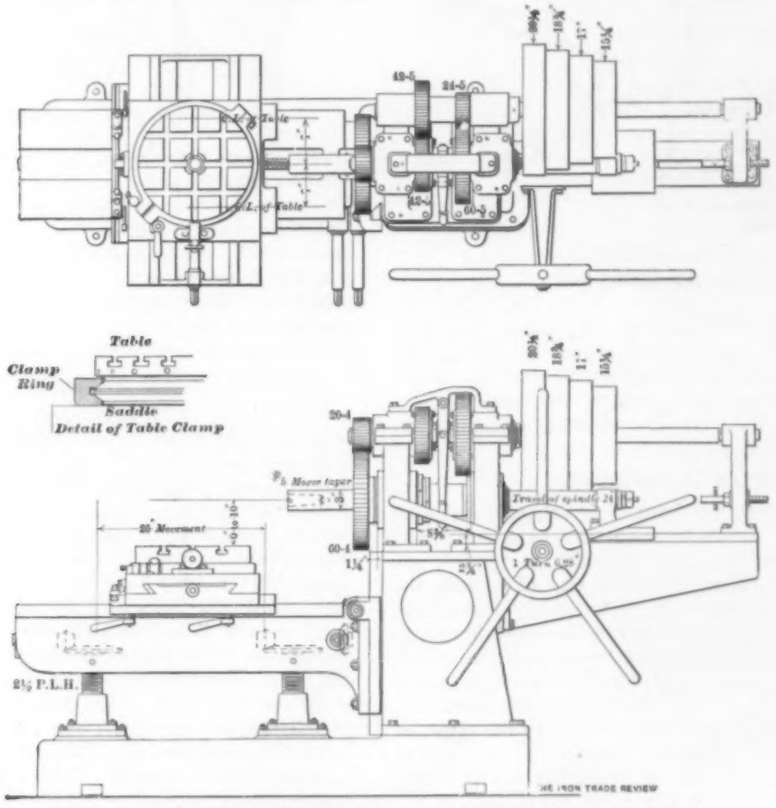


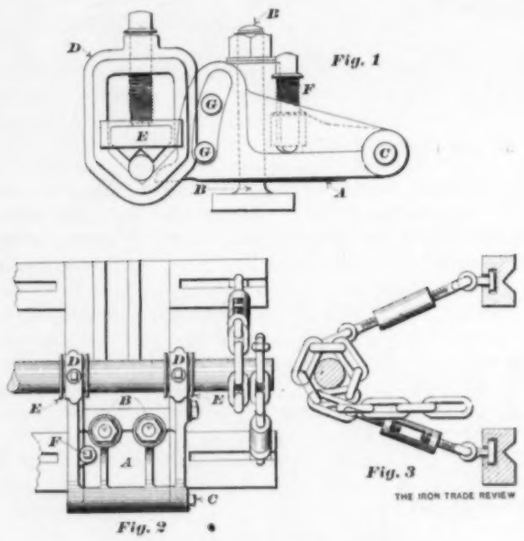
FIG. 2.—PLAN, ELEVATION AND TABLE CLAMP DETAIL OF SPECIAL MACHINE.

Some New Things for the Shop, Chiefly by Way of the Patent Office.

Adjustable Support for Boring Bars.

Charles A. Strand, of Chicago, has an invention on boring bar supports which is here illustrated. Fig. 1 is a side elevation of the device and Fig. 2 is a plan view with the chain attachment in position. Fig. 3 is a transverse section of Fig. 2.

The base A has two openings for the insertion of the bolts B. These have suitable heads to engage the toolpost T-slots formed in the cross carriage of a lathe. The sides of the base A are planed parallel and an opening C traverses the base and extends to the sides. Two levers are pivoted on a bolt at C carrying a frame D with V-shaped seats for the boring bar. The latter is engaged by saddles E mounted in parallel guides in the sides of the frames D. Setscrews are also fitted to the frames D and bear on the saddles E to clamp the boring bar securely. An adjusting screw F is fitted through a lug in one of the supporting levers with its point resting on the upper face of the base A. Two clamping bolts G pass through a circular slot in the base A and fit holes in the supporting levers. The support is adapted to hold a large range of boring bars and but two sizes of the device are required to fit all lathes of over twelve inches swing.



SUPPORTING THE BORING BAR.

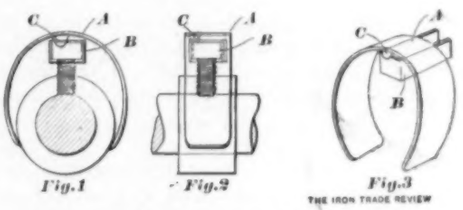
When the larger size is employed for holding long bars during very heavy boring, the end of the bar holding the cutting tools tends to tilt downward and the rear end of the bar is lifted. To prevent the drooping of the cutter carrying end of the bar the inventor has designed a chain device which is shown at Figs. 2 and 3.

Setscrew Improvement.

The projecting setscrew dies hard. It is not easily improved out of existence and occasionally suggestions of various means of rendering it as safe a shop companion as possible are brought to light. These are all in the way of drawing the fangs of the thing and making it as innocent as a projection of rotary habits can be made. A suggestion which has taken concrete form in recent patent office literature is the one illustrated by the engraving. Here Fig. 1 shows a transverse section of a shaft with an edge view of a guard applied to a setscrew and collar in the manner prescribed by the patent of Charles E. Pierce, of Cambridge, Mass. Fig. 2 is a side elevation of the guard and a corresponding view of the collar. Fig. 3 represents a perspective view of the guard.

The shaft A has a collar B and the two are held together by a setscrew in the usual style. Of course the part B may be anything but a collar so long as it rotates and is secured by a setscrew with a projecting head. The guard is formed out of springy material, such as sheet steel, and is made in clip fashion to snap over the shaft. This clips the collar and at the same time rests against the head of the setscrew. The central portion of the clip or yoke is provided with a device for engagement with the setscrew so that when the clip has been moved to the position shown in Figs. 1 and 2, it cannot be shifted endwise in line with the axis of the shaft. This holding device can be made of flexible stock, such as a strip of sheet copper. One edge of the strip is attached in any suitable way, as by a soldered connection, with the central portion of the bridge at C. This connection is made midway between the ends of the strip, and the ends extend in two arms as illustrated in Figs. 1 and 3. The strip is usually bent to fit the three sides of the setscrew head before the strip is attached to the clip, and the length of the arms is sufficient to bend into engagement with the fourth side of the setscrew. The meeting place of the two ends can be seamed or soldered together. The flexibility of the strip enables it to be shaped to the different positions of the setscrew. The device when in the condition shown in Fig. 3 can be very quickly engaged with a collar and setscrew, the bridge being first forced onto the collar in the position required to cause the strip to bear on three sides of the setscrew and then the ends of the strip are bent around to complete the socket.

So long as the socket is large enough to get over the head of the setscrew it is not apparently of much consequence whether the strip fits the squares on the setscrew or not. The clip will hold it down in place anyway and, so far as that goes, it would be best that the strip should not fit the setscrew head



SMOOTHING OVER THE COLLAR SETSCREW.

closely because the setscrew may be rotated slightly on some occasion after the collar has been removed for any purpose. The main difficulty with protective devices of this type is that their protective properties are very limited. At slow speeds the clip will fend off almost anything that comes in contact with it and will do it safely to all concerned, but at high speed it is quite another affair and is then a lively eccentric and this is a very evident projection though not as mean a nuisance as the average collar setscrew.

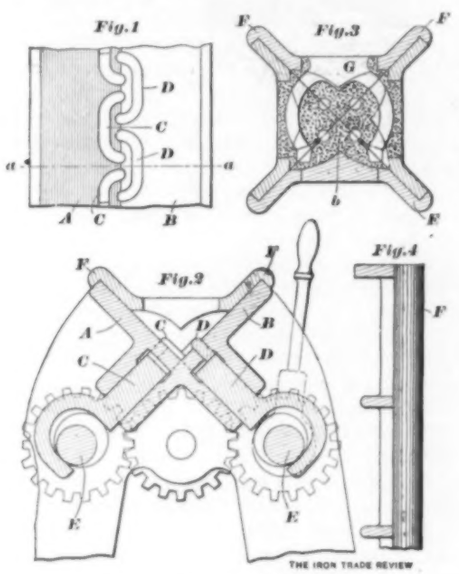
The Making of Chain.

Charles Mills, of Newton Upper Falls, Mass., has a method of forming the molds for manufacturing chain links. This is illustrated in the several views. Fig. 1 is a plan view of one form of mold for carrying out the invention, and Fig. 2 a section on the line a-a in Fig. 1, showing the flask in position and the supporting frame. Fig. 3 is a section through the complete mold when ready for use, and Fig. 4 is an enlarged section on the line b-b of Fig. 3. Chains, as is well known, are formed of a series of links joined in a continuous piece and it is quite difficult to make a chain by the ordinary molding process. The present invention is intended to overcome the usual difficulties and enable links to be formed of any shape and in sections of any desired length.

Referring now to Figs. 1 and 2 and here is illustrated the machine for molding chain. This consists of two inclined plates A and B (best made in one piece) and arranged at right angles to each other to form a V-shaped trough. The trough may be made of any requisite length, the inner surfaces being finished to form the stripping plate. With the plates A and B are the blocks supporting the patterns, as at C and D. The shape of these depends, of course, upon the link to be made

and they pass through openings in the plates A and B, as is best seen in Fig. 1, and are attached to the pattern blocks. The blocks are moved back and forth in drawing the patterns from the sand in any suitable manner, as, for example, a shaft is in this case illustrated at E, provided with eccentrics engaging the pattern blocks, the rotation of the shaft reciprocating the blocks. The flask is formed in four sections, one section being shown in position in Fig. 2. The four sections are applied to the machine separately, adjacent sections being shifted the length of one link, and are thus formed from the same machine and are then brought together to make up the complete mold. The sections can be of any desired length and provided with bars across their outer faces and the sand is in the usual way rammed between these bars. Two of the flask sections are provided with lips F, which rest on the edge of the plates A and B when the flask is being rammed and these flanges engage the edges of the other two sections of the flask when put together, as seen in Fig. 3, thus ensuring a fixed relative position of the sections of the mold.

The section through the flask shown in Fig. 3 depicts the various sprue holes through which the metal passes. The metal is poured in at G and then passes along the horn shaped passage and into the longitudinal sprue hole. The sprue patterns are placed on the plates A and B as required, the horn sprue pattern bridges across from one plate to the other and is set in loosely and drawn when the flask is lifted from the machine, both ends being of course exposed.



THE CASTING OF CHAIN LINKS.

When the machine is in use, one of the flask sections is placed in position, as seen in Fig. 2, and the sand is rammed in the usual manner. The pattern blocks are then moved to withdraw the patterns from the mold. The section of the flask is then removed and another section substituted and the process repeated. After the four sections of the flask have been operated upon, these sections are united to form a complete mold and the metal is poured in the sprue openings and a section of the chain formed. A chain of any desired length may be made by placing the ends of the sections of chain already cast in the ends of the molds.

A Patternmaker's Dog.

Freeman L. Curtis, of Barberton, O., has invented a clamping dog for the use of woodworkers. This is a device for holding pieces of work while they are being turned as in the case where two or more pieces of wood are assembled in practically a solid body to form a sectional pattern. The pieces of wood are held together without the aid of dowels or glue and the device will permit the pieces of wood to be supported by the lathe centers without the employment of auxiliary arbors, etc.

A sectional elevation is shown in Fig. 1 of two pieces of wood held at the end by a dog of the proposed type. It is understood of course that the other ends of the wood are held together by a similar dog when the wood is turned to cylindrical form. Fig. 2 is an enlarged detail and sectional view of the ring dog detached and Fig. 3 shows a number of pieces of wood held together by a dog.

The ring dog A has a flange B that tapers to a sharp edge. The outer wall of this flange is of uniform diameter from edge to edge but the inner wall, as indicated at C, is tapering,

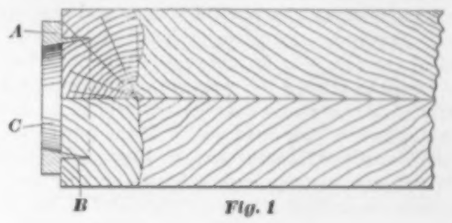


Fig. 1

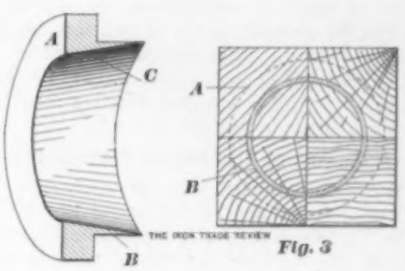


Fig. 3

Fig. 2

WOOD CLAMP FOR USE IN THE LATHE.

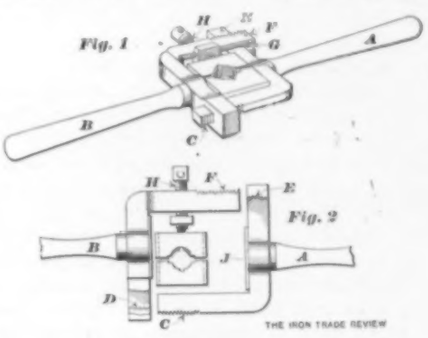
being gradually reduced in diameter from the thin entering edge. The driving portion of the ring is formed of a thickened flange A, and this may be driven by a hammer to force the thin edge of the ring into the wood.

Two or more pieces are assembled and clamped in a vise, after which the thin edge of the ring is placed in position against the wood and the ring is driven home by one or more hammer blows. Owing to the gradually-decreasing diameter of the inner wall of the flange, the sections of wood will be drawn toward the center of the ring and will be firmly clamped and held to each other, while the straight wall, which forms the outer portion of the flange, "will enter the grain of the wood without tending to split the same, and in practice it is found that the driving in of the ring dog will tend to hold the sections of wood together even more tightly than when clamped in a vise."

After the turning operation is completed the ring may be knocked off by a hammer blow, and the sections will separate from each other.

A Separable Diestock.

A perspective view of the diestock invented by Elroy Leonard, of Lenox, W. Va., is shown in Fig. 1. The illustration depicts the stock assembled and holding a die for cutting screw threads. Fig. 2 is a view in plan of the parts disas-



A NEW DIESTOCK.

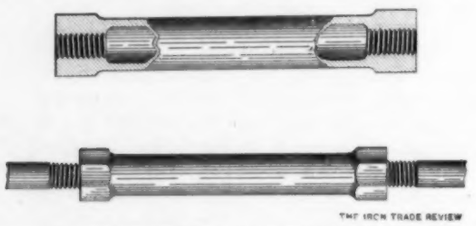
sembled and showing a die of the preferred form in position to be held by the gripping members.

The invention consists broadly of two frame members, each of which forms a right angle and is adapted with its fellow to be secured together to form a rectangular frame of variable proportions in which dies of different size may be held. Each

of the frame members has interlocking teeth providing for adjustment of the frame to clasp dies of various sizes. The handle A is fastened at right angles to the arm of one of the frame members and B is a similar handle attached to an arm of the other one. Teeth C are cut on the outer surface of the arm and similar interlocking teeth are provided at D to engage with those at C when the tongue and slot are fitted together. Teeth are also cut in the arms at E and F, and at the end of the arm F is an opening G through which a pin may be passed to prevent the complete separation of the frame members. A screw passes through the arm at H and has a check nut which is channeled out to fit the inner surfaces of the slotted arm and prevent any rotation. The inner surfaces of the arms are provided with ribs at J, adapted to engage with corresponding grooves on the sides of the die. The pressure of the screw H on the die firmly binds the members of the frame together. "Owing to the way in which the die is held in the stock any wear of the die may be compensated for by grinding down the surfaces at which the two halves of the die come in contact in order to restore the original diameter of the die and without this grinding of the two parts of a die in any way affecting the security with which it may be grasped by the diestock."

A Method of Turnbuckle Manufacture.

The method of manufacturing the turnbuckles—shown in longitudinal elevation and section in the illustration—is described by the inventor, W. E. Renner, of Sebring, O., as follows: "I take red short bar iron of the proper width and thickness to form the tubular body of the desired size buckle and shear it to the requisite length. It is then formed by a very rapid and inexpensive operation to tubular shape, brought to a welding heat and butt welded by specially designed machinery. This operation is very rapid, it all depending upon the heating capacity of the furnace in use. In each end of



THE MAKING OF A TURNBUCKLE.

this tubular piece there is inserted a collar of the proper thickness of wall and the length of which equals the length of thread desired in the buckle. This collar is formed by the same process by which the tubular body is made, only the fiber of the iron runs around the collar, while in the body of the buckle it runs lengthwise. The two ends of the tubular body are brought to a welding heat, placed in spherical dies and plungers pass in at both ends expanding the inserted collars. This operation fills up the hexagonal depressions in the dies and at the same time welds collars and body into a homogeneous mass with the fibers of the iron running around the inner section where the threads are tapped. From this operation it goes to the tapper and is finished.

"It can readily be seen that this buckle gives thorough protection to the threads of the bolt ends and thereby protects its own threads from being destroyed in case the bolt ends are removed. It has greater strength with less weight owing to the perfect distribution of the metal and is also very neat in appearance. Turnbuckles are commonly used at points where it is impossible to make a full turn with a bar, or even a half turn without the operator changing his position one or more times. With my buckle one or two wrenches "pipe or ordinary" can be used at the same time and the operators do not have to move out of their tracks in making the adjustment."

Collar Screw Elimination.

The patent already described in this issue of *The Iron Trade Review* recognizes the dangerous possibilities of the setscrew projecting from a more or less rapidly rotating collar on a shaft and attempts to soften the contact (with anything or anybody that may come in the near neighborhood) by a steel clip to round off all corners. This is beneficial so far as it goes but the invention of C. H. Melius, of the Melius-Steele Machine Works, at Gloversville, N. Y., goes a step further and proposes the elimination of the screw.

The shaft collar designed by the inventor has no setscrew and there is nothing to mar the shaft, which is an additional advantage as anyone familiar with shaft erection and the change of pulley location and equipment will appreciate. Fig. 1 is a sectional view of the collar applied to a shaft, Fig. 2 is a side elevation of the inner half of the collar, Fig. 3 is a side elevation of a modified form of the outer portion of the

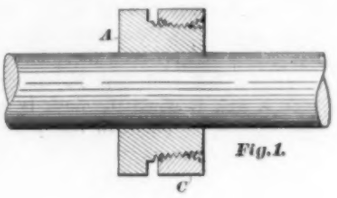
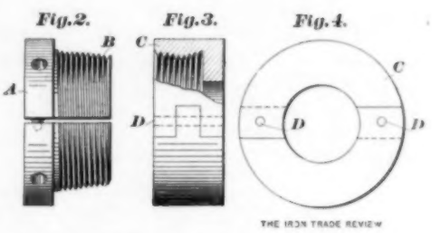


Fig. 1.



THE PASSING OF THE COLLAR SCREW.

collar and Fig. 4 is a face view of Fig. 3. Fig. 5 is a half-tone reproduction of the collar and its elements. Ordinary shaft collars are in the form of a continuous ring and it is necessary to slip them over the end of the shaft, and the collar is secured by the objectionable setscrew. The inner part of the collar is made in two parts A to fit around the shaft. The part A has an annular flange with radial holes to fit a spanner. The balance of the part A consists of a tapering screw threaded portion B. The exterior part or nut C is threaded with a curved thread—the threaded portion is convex in section. The halves of the part A when arranged on the shaft do not come in close contact with one another but are a slight distance apart and when the nut C is threaded upon the portion B the halves of the part A will be drawn together and tightly clamped upon the shaft. Owing to the convex thread the sections are drawn together with but a few turns of the nut. The part C is also made in halves as illustrated in Figs. 3 and 4. These halves are mortised one into the other and pins D extend through one-half and into the tongue of

FIG. 5.—THE NEW SHAFT COLLAR.

the other half. The firm has put in special machinery for the manufacture of these collars to standard sizes.

Hot Box Indicator.

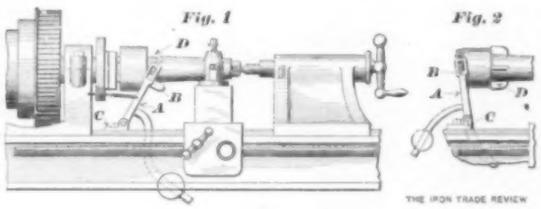
B. H. Thwaite, of London, has invented an electric appliance for the automatic detection of hot bearings. A small tube is applied to the bearing and in communication with the oil. A thermometer with electric contacts is placed in the tube and connected with an indicator board. As the temperature of the oil rises, the mercury in the thermometer expands to the point where the contacts are bridged and the closing

of the circuit brings a solenoid into action, a red disc appears on the indicator board, an incandescent lamp may be lighted and a bell can be rung. The scheme is neat and on many grounds preferable to reliance upon the infrequent sense of touch or the unsatisfactory smell from burning oil. Some bearings cool quickly when the thick oil has been made sufficiently fluid to flow easily. The cold oil in the bath may be quite thick and the lubrication imperfect but the rise in the temperature of the bearing liquefies the oil and relieves the trouble. The warm bearing is not always to be taken as a sign of grave danger but needs to be closely watched and if due to thick oil may be cured automatically. With more serious causes the new indicator will continue to call the attention of the man in charge to the urgency of the case.

A Lathe Attachment.

This arrangement of the lathe has been devised by Peter Krepp, of Pittsburg, to enable the workman to turn up surfaces of both straight and taper contour at the same time. The lathe as ordinarily used is adapted for either one of these purposes but seldom for both operations to be carried on simultaneously. The invention in question has evidently been proposed for the work of machining axle boxes which have straight and tapered surfaces.

A side elevation of the lathe is presented in Fig. 1 with the attachment in place and Fig. 2 is a fragmentary elevation showing a modified form of construction. The lathe shown is of the average type with the usual carriage driven by a feed screw. An auxiliary toolholder A is provided, the tool itself B being secured by a setscrew. The center in the tailstock has been moved over to bring the angular surface of the work parallel with the ways of the lathe bed. That portion of the work projecting to the left is, however, straight and the toolholder, A, fitting on the adjustable bracket C, can be swung around to bring the sweep of the tool fairly parallel to



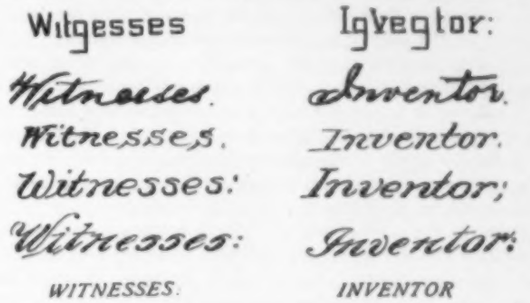
TURNING STRAIGHT AND TAPER SURFACES SIMULTANEOUSLY.

the straight surface. The brackets C are slotted for this purpose and are readily swiveled to suit the work. The auxiliary toolholder A is fastened to the brackets C by a hinge connection, a counterweight being applied to the holder in order that it will be maintained normally in an idle position, the movement being limited by the chain linking the holder and headstock. At one end the holder is provided with a boss which comes in contact with the lathe carriage and the working movement of the latter will force the toolholder and cutter along the work.

As illustrated in the drawings, Fig. 1, the piece of work consists of a hub bushing with holding strips D of such size that the tool B may readily pass back and forth without interference. The case is otherwise in Fig. 2 where the lugs D project beyond the rest of the surface and therefore it is there necessary for the tool to travel in the opposite direction. Here the auxiliary toolholder A has a counterweight placed on the opposite side from that form shown in Fig. 1 and the tool B will lie to the left instead of to the right of the work. The carriage will then come in contact with the toolholder below the pivot and the tool B will be moved across the work from left to right. In the one case the tool in the lathe toolpost and the tool in the auxiliary toolholder will move in the same direction across the work but in the other arrangement of the parts, after the carriage has come in contact with the projection on the toolholder the two tools will move toward each other. It is obvious that the surface turned by the auxiliary tool will not be exactly straight, the amount of the deviation from truth being dependent upon the distance betweeen the cutting point of the tool and the hinged connection as well as the setting of the tool below or above the center of the work. The workman will doubtless divide the latter source of error so that the oscillation of the tool below and above the work axis will be equalized and as regards the other matter it is probably of little consequence anyway for axle boxes fitting tightly in wood and will of course be less with greater length of toolholder and narrower work.

Lettering for Patent Office Purposes.

The one branch of the draftsman where his fancy is frequently allowed free rein is in the matter of lettering. Pro-

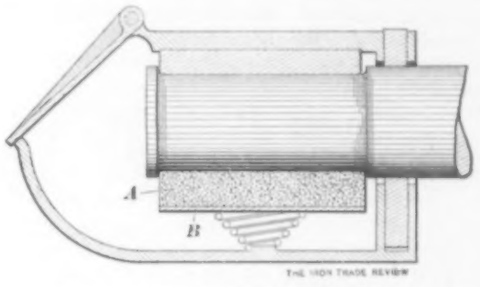


RECENT EXAMPLES OF LETTERING FOR THE PATENT OFFICE.

vided that the penmanship is plain and unmistakable perhaps there is but little room for criticism. It may be of some degree of interest to show a selection taken from a recent batch of the grist turned into and out of the patent office as illustrative of the individual point of view a draftsman may take. A greater variety could no doubt be obtained by a more prolonged search and in the matter of representing numerals something too could be shown, but the present sample is quite suggestive in its way.

Lubricator Improvement.

A number of comments on the possibilities and common practice of lubrication are contained in the patent of John E. Gill, of Franklin, Pa. The illustration shows a journal box fitted with the improved lubrication device and the following discussion of lubrication is abstracted from the statements in the patent. The inventor avers that although a fluid lubricant, such as oil, is one of the most satisfactory means of reducing friction, it is expensive not only because of the cost of the lubricant used but because of the large amount wasted and it is often troublesome because of difficulty in obtaining a satisfactory feed to the bearings. In some cases as, for instance, in the journal of the axle box, the fluid lubricant, although it reduces friction, does not serve properly to protect the bearing from contact with dust or cinders which tend to wear and heat the bearings. On the other hand, while a solid lubricant is desirable on the score of economy and of protection to the lubricated parts as well as the ease with which it may be fed, the friction between a solid lubricant and a journal is appreciable. When the machinery is at rest and the solid lubricant which has been softened by friction with the rotating journals, has again hardened, the friction puts an undesirable initial load upon the motive power. It is also desirable to apply different lubricants to different situations.



SOMETHING NEW IN JOURNAL LUBRICATION.

For instance castor oil makes an ideal lubricant but is difficult of application because the heavy body prohibits feeding by capillary action. Various compounds, such as oils and greases or compounds of oil with graphite, sulphur or lead compound, would furnish ideal lubricant for certain situations; but in the case of oil mixed with graphite or similar substances the heavier ingredient is precipitated and the compound cannot

be kept in such a state of agitation as to provide a homogeneous lubricant at all times. The effect of light and temperature as a deteriorating influence is often noticeable in compounded lubricants.

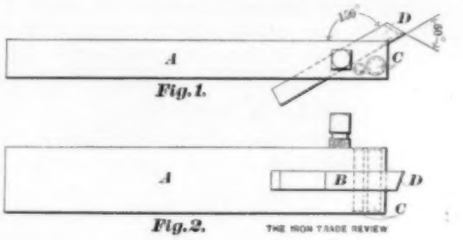
In order to meet some of these objections the inventor provides a cake of solid lubricant A which is mounted on a plate B and is pressed by the spring against the journal, the lower end of the spring being mounted in the bottom of the journal box. The cake of lubricant is provided with means for retaining a fluid which will be smeared over the bearing surface of the cake A by the rotation of the journal. While in its simplest form the lubricating cake A may be of grease, the improvement suggested by the inventor permits of making this cake of a compound of grease or graphite or other elements which it may be desirable to mix with a fluid element to make the desired lubricant for a given situation. By mixing graphite, sulphur, lead compound, etc., in the cake of grease and by supplying the superficial chambers with oil the rotation of the journal will not only mix the solid grease with the oil in the chambers, but will also wear off and mix with the oil portions of the graphite which are in the cakes of solid grease, the journal thereby making its own lubricating mixture.

To avoid any necessity for renewal of the oil from time to time during the life of the cake of solid lubricant and to provide the fluid element in such quantities as may be needed, but without unduly wasting it, the inventor provides the body of the cake of solid lubricant throughout with closed cells in staggered relation to each other. As the rotation of the journal wears off the surface of the cake and gets down toward the bottom of the oil receptacles it will also open successive layers of these cells and the fluid will therefore be supplied constantly and in regulated quantities as the journal wears through the solid lubricant. Obviously the cells may be filled with different lubricating elements, so that the rotation of the journal will not only serve to open the cells and supply a fluid to the bearing surface of the solid lubricant, but the rotation of the journal will also serve to mix different elements together, producing lubricating compound which is freshly compounded as it is consumed.

So far the inventor has referred to the cells as being provided throughout the body of the solid lubricant, and has only suggested the simplest form—that is, recesses formed within the solid lubricant. It is, however, obvious that these cells of fluid lubricant may be readily provided by filling capsules of paraffin or of any other suitable material with the fluid and disposing these charged capsules throughout the body of the grease-cake. The inventor points out that the arrangement has some automatically-regulating features—as, for instance, if an oil be supplied which has not sufficient body for the surface required we will not only obtain from the revolution of the journal a mechanical mixture of the solid lubricant and the oil, but since the mixture is insufficient for the surface some friction will result. Indeed, the heat generated by this friction will superficially melt the solid lubricant, adding a greater proportion of it to the amount of oil and producing a lubricating compound having a heavier body, which will rapidly cool the journal to a point which will adjust itself where only sufficient heat will be generated by the journal to insure the requisite supply of softened lubricant. This, however, is simply referred to as an emergency feature of the device.

A Simple Threading Tool.

A threading tool of simple construction has been patented by Robert McNeil, of Port Chester, N. Y. Figs. 1 and 2 show respectively the plan and elevation of the tool as arranged for ordinary exterior work on studs, spindles, etc. The patent papers call the device an "inside" threading tool, and in the drawings used in the application sketches of inside tools are shown. The scheme is, however, just as applicable to threading for outside as well as inside threads and comprises a toolholder shank A with a slot cut in the end at an angle with the shank axis. This slot at B is made large enough to receive the cutter D which is of square cross section. The gap in the end of the toolholder is plugged with a triangular block at B to leave a square opening for the cutter D which is secured in place by a setscrew in the usual style. The block B is fastened by rivets C which pass through the block and shank and firmly tie the parts together. When the filling piece B is inserted in the mouth of the slot and secured by the rivets, the thickness of the block being equal to the width of the slot, the edges are dressed off smooth with the sides and end of shank and the hole will have the appearance of being pierced through the solid stock of the toolholder. It is claimed by the inventor that it is a much easier task to cut the slot and fill up the balance of the space outside the cutter cross section with a triangular plug than it would be to drill and broach a square hole at an



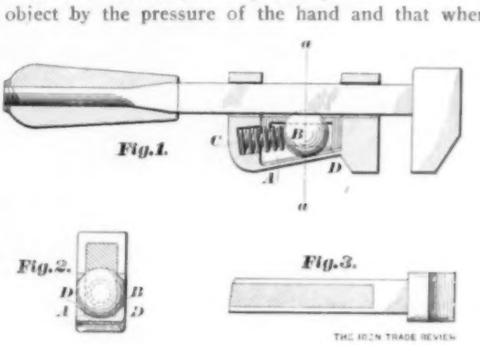
THREAD TOOL SIMPLICITY.

angle to the axis of the bar. At any rate that is the opinion upon which the patented plan has been based and put into practice.

There is an additional feature which does not apply so much to the convenient construction as to the use of the tool. The method is carried out with the purpose of the cutter being at a definite angle to the bar. Whether the cutter is applied to an inside threading toolholder or is used for male threads the angles of either are cut to a certain number of degrees from the axis of the shank as the inside or outside work requires. The cutter is on this account ground only on the end. In cutting a thread on a stud therefore the toolholder, as in Figs. 1 and 2, can be set parallel with the faceplate or cross slide of the lathe and the length of the shank is sufficient to permit quick action in this particular, an advantage of some consequence in lathe production. The plugging of a slot with a piece of metal in order to leave an opening of any particular shape is not unusual and the grinding of a cutter wholly on the one side and setting it at an angle to divide the included angles of the point against the work in the lathe is also a familiar procedure. The patent therefore in its essential features uses well known expedients to attain the desired end.

A Monkey Wrench Minus an Adjusting Screw.

The adjusting screw is commonly accepted as an essential feature of the monkey wrench and so far as that goes few if any wrenches of an adjustable character seem to have surviving qualities without that particular means of adjustment. Louis P. Keller has recently been allowed a patent on a "sliding jaw" wrench which is asserted to be "of such construction that a movable jaw may be adjusted to fit a nut or other object by the pressure of the hand and that when so



A NEW WAY OF ADJUSTING THE MONKEY WRENCH.

adjusted the jaw will automatically become rigidly locked, rendered incapable of movement by pressure applied between the jaws, and at the same time be readily moved manually to release a nut or the like or to enlarge the opening between the jaws. Further, the object of the invention is to provide a wrench in which the parts shall be of a construction which require in their formation or fitting little or no hand or machine work, thus simplifying and cheapening their construction."

Fig. 1 is a longitudinal sectional view of a wrench made in accordance with the invention. Fig. 2 is a transverse sectional view of the wrench on the line a-a of Fig. 1, and Fig. 3 is a plan view of a section of the shank showing a modified form. The shank, fixed jaw and the handle are of the accepted type in common service in the shops and need not be further described. The invention is centered at the movable jaw which, however, corresponds in size and gripping contour with the stationary jaw. The sliding jaw has a housing A and the inner surface is formed with an abrupt incline extending outward from the end adjacent to the jaw. Within the housing and bearing at one side against the incline and at the other against the shank of the wrench is a hardened steel ball B. The sphere is normally pressed against the inclined face by a spring C which rests at one end against the inner surface of the housing and at the other bears against the ball. The sides A of the housing are provided with slots D and the size of the sphere is such that when the parts are assembled the ball projects through the slots and it may be grasped by hand from the outside. In order that the ball may be prevented from becoming displaced by rough use of the wrench, the inclined surface and that part of the shank against which the ball bears are made concave, affording a means for securing the sphere in place as shown in Fig. 2.

The inventor claims that the binding of the sphere between the inclined face of the jaw and the shank will ordinarily be perfectly effected when the surfaces with which the ball comes in contact are smooth. He shows the surface of the shank roughened as in Fig. 3 as in some cases it may be necessary to prevent the sliding of the sphere. A practical trial would, however, be essential to convince some mechanics that the ball could be easily freed by the fingers when this is necessary in the adjustment of the wrench. The one is just as requisite as the other convenience in the way of a sure grip with easy adjustment.

The housing has a projection at each end with an opening for a sliding fit around the cross section of the shank. An open space between the projections and the sides of the housings allows the introduction of the sphere and spring before the shank is passed through the openings in the projection when assembling the parts of the wrench. The sphere is located in the line of pressure exerted in grasping an object between the jaws so that a direct binding action free from any torsional strain is effected between the jaw and the shank. As the sliding jaw is moved the sphere is carried with it, and when the jaw abuts against an object the sphere is held against the incline by the spring. A pressure exerted by the use of the tool on the object grasped will at once seat the sphere. To remove the movable jaw from contact with the nut the ball is grasped and moved away, releasing the sphere from the binding action between the inclined face and the shank and permitting its free movement.

Canadian Duty on Rails in Force.

A proclamation was issued on Aug. 27 by the Canadian Government to bring into force the act of 1903 imposing a duty of $7 a ton on steel rails. This duty was to take effect when sufficient evidence was furnished to the Government that rails of the best quality were being made in Canada in sufficient quantity to supply the ordinary demand. As a rail mill at Sault Ste. Marie is now in operation, the act becomes effective. The duty will not apply to any rails actually contracted for abroad prior to Aug. 27, but such rails must be imported into Canada not later than Nov. 30, 1904, and must be laid on the track not later than Feb. 28, 1905. The plant at the Soo resumed Aug. 23. It was not expected that rails would be rolled before Sept. 1, but Superintendent Lewis pleasantly surprised the Canadian and American cities at the Soo by starting a week earlier. The blast furnaces will soon be blown in.

Steamship agents report a very heavy demand for tonnage by the exporters of harvesting machinery. A large quantity is being shipped to South America and there are also large European shipments. The ocean freight rates are so low that exporters are able to place American goods in foreign ports at comparatively small cost.

CENTRAL FOUNDRY CO.'S REPORT.

The Central Foundry Co. reports for the fiscal year ended June 30 net earnings of $467,504, a decrease of $197,945, as compared with the previous year. After the payment of $231,780 bond interest, there remained a balance of $235,724, of which a small proportion was appropriated for betterments and the remainder charged off for depreciation. This company is a consolidation of companies and firms manufacturing heavy cast iron soil pipe and fittings, with 14 plants in New York, Pennsylvania, Maryland, Indiana, New Jersey, Tennessee, Alabama, and Delaware. It has outstanding $6,650,000 each of common and preferred stock, besides $3,863,000 of 5 percent debenture bonds.

For the past two years the directors have followed the policy of charging off the entire surplus to betterments and to depreciation, so that the company carries no surplus account. The income account for the year to June 30, 1904, is as follows:

	1904.	Decrease.
Net earnings	$467,504	$197,945
Bond interest	231,780	
Balance	$235,724	$197,945
The balance was appropriated as follows:		
Replacement and betterment of equipment	$17,290	$63,766
Depreciation, etc.	218,434	134,179
Total	$235,724	$197,945

The balance sheet as of June 30, 1904, is as follows:

Assets.		Decrease
Plant investment	$15,345,382	$177,374
Treasury stock	700,000	
Stock sub. companies	1,100,000	*400,000
Notes from sub. companies	117,908	71,311
Accts. and bills pay	408,021	23,842
Inventory	426,218	21,121
Cash	63,447	*9,542
Unex. ins. and taxes	3,025	2,582
Furniture, etc.	4,771	
Total	$18,168,772	*$113,312
Liabilities.		
Capital stock	$14,000,000	
Debenture bonds	3,863,000	
Accrued bond int.	38,630	
Accounts payable, etc.	267,142	*$113,312
Total liabilities	$18,168,772	*$113,312

*Increase.

At the annual meeting of the stockholders, held in Jersey City Aug. 25, the retiring board of directors was re-elected and H. H. Spencer was added to the board, making the total number of directors 12. The board now consists of James T. Boothroyd, George F. Crane, Alfred Fowle Jr., George D. Hallock, Joseph Lodge, John Reid, Winthrop I. Rogers, George F. Ross, Gerard Schumacher, Charles F. Smithers, A. L. Swartz and H. H. Spencer.

The Union Pacific railroad announced on Aug. 25 a large reduction in the rates on wire and nails from Chicago to Colorado common points. The tariff rate has been 77c per 100 pounds. Beginning Aug. 29 the rate was made 45c. The explanation by the Union Pacific is that the freight movement at present is unusually light and a lower figure was necessary to stimulate business. It is the opinion of officials of other lines, however, that the action was taken in the interest of the American Steel & Wire Co., which is strongly competing for the Western business with the Colorado Fuel & Iron Co. The former company is said to have from 400 to 500 carloads of wire ready for shipment at Pittsburg and Chicago, which is to be sent at once to Colorado common points at reduced rates. The Missouri Pacific has come to the rescue of the Colorado Fuel & Iron Co. by announcing corresponding reductions from Pueblo to Missouri river points. Its rate will be 29c. The normal figure from Chicago to the Missouri river is 27c, and 50c from the Missouri river to Colorado common points.

The Virginia Iron Works, Virginia, Minn., have been sold to Duluth and Eveleth parties, who will probably add to the capacity of the plant.

Cincinnati Machinery Market.

CINCINNATI, Aug. 29.—As the summer season draws to a close a retrospect of business in the machinery trade of Cincinnati discloses conditions on the whole somewhat better than were expected for that period. Concerns that were dull in June and July have taken on more business in August and some of the shops that were busy early in the summer are now finding trade quiet. This irregularity in the trade was noticeable also for shorter periods in the same shops. For a week or two orders came in encouragingly and then there was a lull. Irregularity in demand continues to be a feature in the trade. It is safe to say that the shops are busier now than at any time during the summer season. In the few instances where stock was accumulated, such stocks are being worked down. There are more specifications for machinery being figured on and more transactions pending than for some time. Buyers are slow to close, however, and business needs urging. Price inducements are made in some lines. From correspondence and orders pending as well as the general complexion of the trade, shop managers are anticipating a further improvement in demand this fall.

In this connection it may be mentioned that agricultural conditions are accepted in many quarters as a basis for forecasting general business conditions. It may not be inappropriate to say that the Cincinnati *Price Current*, a leading authority on agricultural conditions, has stated that the apparent probabilities of the outcome of cereal crops in the United States at the close of August represent a quantity 7 percent in excess of the total of such production last year—a quantity only once before equaled, that being the season of 1902; a quantity 10 percent greater than the annual average of the past five years. With this is a large hay crop and a more than average production of potatoes. With the crop situation in such a promising condition, at least one of the arguments of the pessimist is removed.

The Lodge & Shipley Machine Tool Co. has a number of large orders pending and is fairly well supplied with current business. Orders are spasmodic—good one week and quiet the next. In a general way trade is holding up. Increasing demand for motor-driven tools is noted. The company is at work on improvements in its line and is giving attention to motor drives.

The Cincinnati Planer Co. has experienced quite a revival of business and is talking of increasing its force. The company is steadily at work on orders and has a good volume of business pending. The outlook for fall trade is quite encouraging.

Greaves, Klusman & Co. report business quiet in the machine tool line, but are getting orders for pattern-making machinery. They regard this as a favorable sign, indicating that general improvement in machinery lines must be under way.

The Cincinnati Machine Tool Co. is now in its new shop, and is getting into working order quite rapidly. Some new machines have been purchased and are being installed. The offices are being furnished and the plant is taking on the appearance of a handsome, up-to-date shop. Business shows improvement and the company notes many more specifications coming in to be figured on.

The Ansonia Copper & Sheet Iron Works have broken ground for a new shop at Gest street and C. H. & D. R. R. It is to be a one-story structure 192 x 166 feet. When completed it will be perhaps the largest copper shop in the country. The company makes a specialty of distillery appliances.

The John Steptoe Shaper Co. notes no change in conditions. New orders have not been so large as earlier in the summer, when the company was enjoying more than the usual run of business. There is enough business ahead, however, to keep running without making stock.

The Cincinnati Iron Store Co., which was recently appointed agent in Western and Southern territory for the Lackawanna Steel Co., has purchased the property of the old Scott Pottery Co. and the car barns at Front street and Freeman avenue and will build at once. It will move into the new quarters as soon as completed. A railroad switch will be run into the plant and modern facilities for the handling of the business will be provided.

The Cincinnati Metal Trades Association postponed from time to time the proposed outing which it had intended to arrange during the summer, owing to the absence of many of its members on summer vacations. It is probable that no meeting will be held now until some time in October.

The Oesterlein Machine Tool Co. has completed its arrangements for its new building and the building permit has been applied for. The plans are now in the hands of architects. The structure is to cost about $18,000.

The Pennsylvania Railroad has made application to the city authorities for an ordinance which will grant it the right to switch cars over what is known as the "Street Connection" track during the daytime. The passing of such an ordinance would be a serious detriment to the large machine shops of the J. A. Fay & Egan Co., the Lane & Bodley Co., Smith, Myers & Schnier Co., and the plant of the Samuel C. Tatum Co. These concerns are making a vigorous protest against the ordinance in its present form.

Worcester Pressed Steel Co.

The Worcester Pressed Steel Co., Worcester, Mass., has been incorporated with a capital of $50,000, all paid. One of the heaviest stockholders and president of the board of directors is Milton P. Higgins, president of the Norton Emery Wheel Co., of the Plunger Elevator Co. and of the Norton Grinding Co. George I. Alden, treasurer of the same companies, is also a director of the new company. The general manager is to be John W. Higgins, who has been superintendent and secretary of the Plunger Elevator Co., Worcester, since its organization in 1896. Mr. Higgins, who is a graduate of the Worcester Polytechnic Institute, made a trip last spring to Europe to investigate processes used there and secured options on a line of patented goods to be made of pressed steel. As the first step in the inauguration of the plan for this new enterprise, the Worcester Pressed Steel Co. acquired, last week, the property of the Worcester Ferrule & Mfg. Co., an old and well known cold metal working establishment in Worcester. The new corporation will assume the management of the newly acquired property Sept. 1. The Worcester Ferrule & Mfg. Co. was established 20 years ago and has been very successful. It has an extended trade with Continental Europe and continually receives large orders from Germany, Belgium and Sweden. It has a high reputation for fine cold-drawn steel work and intricate tools and dies. The new company is considering plans for the erection of a plant next year.

Machinery Day at St. Louis.

Among the features of special interest at the St. Louis Exposition on Sept. 10 will be a test to be made by the "high speed tool steel makers of the world," as the invitation reads. This will take place in Machinery Hall, Block 7, and will be in charge of a committee of three—one to be selected by the tool steel makers, another by master mechanics of railroads and these two to select a third member. The invitations are sent out by Messrs. Kent, McKenna, Peebles, Colcord and Snyder. These gentlemen represent the following firms in the order as named: Edwin R. Kent & Co., the Firth Sterling Co., the Colonial Steel Co., the Jones & Colver Co. (Novo), and the Armstrong Brothers Tool Co. Mr. Kent is chairman of the committee in charge of general arrangements and some noteworthy exploits in chip production may be expected. This test will be one of the attractions of the day. There will of course be many other things to make the day notable in matters mechanical. The power and tool equipment in engines and other machines will be in full operation and special demonstrations of machine possibilities will be carried on for the occasion in various parts of Machinery Hall.

Eight million dollars or more will be expended by the New York, New Haven & Hartford Railroad Co. for improved rapid transit from New York City to the Bronx and that part of Westchester lying along Long Island Sound, according to an announcement of President Charles S. Muellen. A connection with the interborough system is proposed among other improvements at West Farms, and it is the plan eventually to give a through service from the Battery to New Rochelle and Mount Vernon.

LAKE SUPERIOR IRON MINES.

Recent newspaper statements as to the large amount of exploration on the Vermillion range are utterly without foundation. Nothing of importance is under way but the work on Section 30 and that of the White Iron Lake Co., a short distance from 30, and this latter is probably not of very great importance. At Section 30 the exploration company has been reaming out a hole 325 feet deep in order to get out a bit that was stuck there, and this work will be completed in a few days. Three drills are working, two of them in deep holes and the third reaming. The bit was probably stuck in ore. The exploring syndicate has not decided what will be done as to sinking a shaft on lot 6, where it is probable that the main ore body to be found on the section is located. At White Iron Lake a drill has cut magnetic ore, silicious and lean, at 300 feet, and it is hoped by the company that hematite will be cut at about 1,000 feet. The operation is on a part of the Vermillion formation that is generally supposed by mining engineers to be decidedly magnetic.

The new Zenith furnace at Duluth is running on a mixture of Mesabi and Vermillion ores and is making an excellent Bessemer iron, though a slight change in the mixture must be made on account of an excess of manganese for the past few days. So far the work has been largely in the nature of experimenting with ores and coke, but the furnace has come up to 200 tons of product daily, and the iron has been as low as .07 phosphorus for some time. The ovens are working excellently. The expected Sault contracts for Bessemer iron have been closed and daily shipments are made there. Iron that comes below Sault specifications is readily sold in the Northwest. As soon as there is an accumulation of iron and fuel at the Sault the rail mills will resume, on orders for Government railways. As soon as possible employment for 1,500 men will be had at the various plants, rail mills, charcoal kilns, charcoal furnace and in the woods.

The Crow Wing Iron Co. has been organized at Duluth for exploration in Crow Wing county, about 100 miles west of that city. It is hoped that an iron ore region may be found there. Exploration carried on for a year and more has developed the fact that an iron ore range exists, but so far nothing of value has been found, the ore being too lean and silicious to be commercially useful at present. It has been the idea that further exploration might show a better ore and that ore of a grade valuable in the future, if not now, might be found in the vicinity. Lands for a long distance on what is supposed to be the trend of the range have been taken under option and considerable exploration will be done this coming winter. The United States Steel Corporation worked there last spring but decided to abandon operations after making a test of the ground.

Lincoln mine, of the Interstate Mining Co., has been closed indefinitely. It was shut down last winter and was reopened in the spring with the intention of remaining busy all season and of producing about 350,000 tons this summer. It is a large and well equipped underground property and is the chief ore producer for Jones & Laughlins, of Pittsburg.

Biwabik mine at Biwabik is producing about 7,500 tons a day; Mahoning at Hibbing, nearly 12,000 tons; Fayal is shipping nearly 15,000, and Burt & Stevenson are shipping from 15,000 to 16,000 tons daily. These are the largest mines in the Minnesota field.

Mines of the United States Steel Corporation in the Hibbing district alone have on hand in stock piles more than 700,000 tons of ore at this date, and usually so late in the season most stocked ore has been moved forward. The same company's mines at Ironwood, Mich., have on hand about 750,000 tons. Their mines at Ishpeming, Iron Mountain, Eveleth and Ely all contain large stocks, and much of this ore must be carried over the winter, to the detriment of labor in the mining region. It will not be possible to make shipments between now and the close of the season that will clean up these stocks.

Though the steamship F. H. Peavey loaded 7,375 net tons of ore in 51 minutes at Wells docks of the Chicago, Milwaukee & St. Paul road last week as has been reported, the vessel was at dock 105 minutes, loading and shifting from pocket to pocket, and her time should be so computed.

Two thousand men are engaged in mines about Hibbing, but this is only half the number employed a year ago in the same district. The change is due to the number that have closed entirely and to the decrease in development and exploration. Mines that are working are employing as many men as ever. But those that have closed are chiefly underground properties, whose employment is greater per ton of product.

Stocked ore at Grant mine, Mesabi range, is to be shipped out to make room for the shovels that are this winter to begin stripping the property in anticipation of converting it into a milling mine. Grant contains a very large ore body, is a State lease and can be mined at reasonable cost. Its grade is similar to that of Sharon, an excellent non-Bessemer, on the whole.

At Clifford mine, operated by the Republic Iron & Steel Co., they have lately been making an output of nine to ten tons per day per man on the payroll. About 130 men have been employed. Clifford is an easily operated property, being an open pit operated by the milling method with an ore easily secured and readily crushed. It is a lean silicious Bessemer running little better than 40 percent iron.

Rinaldo McConnell has been doing considerable iron ore development work in the neighborhood of Port Arthur, Ont., and upon one of his properties is said to have proved over 4,000,000 tons of ore. The indications are so favorable that this ore body extends a considerable distance that the Canadian Iron Co. has been formed to acquire and develop lands in the adjoining township. The company is capitalized at $2,000,000. Owing to the illness of R. W. Demorest, the company's engineer, development work had to be suspended this summer but the company states that work done by other parties on nearby locations has proved of much value and assistance in showing the possibilities.

At the Monroe mine, situated between Quinnesec and Norway, Mich., orders have been given to erect an ore crusher at the shaft and to pump the water out of the mine as soon as possible. Mining operations will then be begun. The mine is owned by the Buffalo & Susquehanna Iron Co., Buffalo.

Domestic Manufacture of Ferro-Phosphorus.

For some time mills making steel sheets and steel plates from basic iron have been using ferro-phosphorus in their open-hearth mixtures, in order to obtain a greater percentage of phosphorus to prevent the sheets sticking together in the rolls. It is customary to use enough of this material to raise the basic steel up to the Bessemer limit in phosphorus. Practically all of it has been imported. It runs from 20 to 25 percent phosphorus and has been selling at $65 to $70 a ton on a basis of 20 percent phosphorus, the price, however, graduating on a basis of $3.25 per unit of phosphorus up or down. Recently a furnaceman has experimented in the manufacture of ferro-phosphorus and has succeeded in making it. The furnace is now being remodeled in preparation for the production of domestic ferro-phosphorus. The market is being canvassed and sales have already been made for October, November and December delivery. Hickman, Williams & Co., of Chicago, Cincinnati, Louisville, Pittsburg and St. Louis, have been appointed agents.

An International Steel Agreement.

Following on the announcement made last week that an understanding had been arrived at between the German Steel Works Union and its representatives in London, we are now informed that the negotiations which have been proceeding for some time past between the German Steel Works Union and the Belgian Steel Works Union, with a view to arriving at an understanding regarding prices of structural material, such as joists, channels, and other sectional bars, coming within the sphere of the respective syndicates, have now been brought to a successful conclusion and a uniform price will be made by the German and Belgian syndicates. The exact limitations of the agreement have not been at present disclosed, but it is difficult to see how the arrangement can affect such materials as angles or bars, or any form of iron and steel which is outside the scope of the German Steel Works Union, because of the absence of any central authority to negotiate.—[London Iron and Coal Trades Review.

Titaniferous Iron Ores.*

BY NELSON P. HULST.

A year and a half ago there were numerous items in Minnesota newspapers advertising the successful local smelting of titaniferous iron ores. So much attention was given to these hasty claims that I judged it would be of interest, to at least some of our members, to learn what had been published in scientific journals regarding titanium and its compounds, and what skilled metallurgists had actually accomplished in the way of smelting titaniferous ores, as well as to know what conclusions had been arrived at from the results. As will appear, the paper is in the main a compilation of matter from the literature on the subject much scattered and very meagre.

Titanium in Rock Formations.

Although titanium was isolated as an element by Cregor as long ago as 1791, it may be accounted a rare metal even today. Its specific gravity, by some old determination, was said to be 5.30. Later determinations made it 3.59. One authority, in speaking of it as a metal, says: "According to the method by which it is produced, it occurs as a gray, heavy, iron-like powder, which burns with brilliant scintillations in the air, becoming converted thereby into titanic acid, TiO_2. At the temperature of 212° Fahr. it decomposes water. It never occurs as a native metal, due to the fact that it has so great an affinity for oxygen. Pure titanic acid in mineral form occurs in the three minerals—rutile, anatase and brookite—which differ only in their manner of crystallization and specific gravity. There are numerous other minerals in which TiO_2 is found, sometimes in chemical combination, more often probably as a physical mixture."

Respecting titanium in the earth's crust, Mr. F. W. Clark, in the Bulletin of the U. S. Geological Survey, No. 78, says: "In the solid crust of the earth the metal titanium is present to the extent of 33 hundredths of one percent of it. It is relatively more abundant than manganese, carbon or sulphur. Nearly all the textbooks on chemistry speak of titanium as one of the very rare metals and class it with cerium or even thorium, although it is found in nature in greater quantity than all of the thirty rarer elements taken together. Iron comprises (by his computation) a little over 5 percent of the earth's crust, i. e., only about 17 times more than the element titanium. Small quantities of titanium are found in nearly all the older rocks, although not often looked for, nor recognized in ordinary rock analysis, for when TiO_2 is not separated in analysis it is reported with the percentage of alumina. Mr. Clark, in Bulletin No. 228, modifies but slightly his figures giving the relative abundance of titanium. Geike, in his "Text Book of Geology," 3d edition, corroborates Clark's assumption of the abundance of titanium in the older rocks. Quoting from the volume mentioned: "Titanic iron (ilmenite) occurs in scattered grains, plates and crystals as an abundantconstituent of many crystalline rocks (basalt rocks, diabase, gabbro and other igneous masses), also in veins or beds in syenite, serpentine and metamorphic rocks, scarcely to be distinguished from magnetite when seen in small particles under the microscope."

We should also expect TiO_2 in the detrital remains of these older rocks which exist in part today as beds of clay. Analysis of the Perth Amboy, N. J., fire clays show TiO_2 present to the extent of from .90 to 2.65 percent. In the lower Kittanning fire clays of Pennsylvania TiO_2 has been found in varying amounts ranging from 1.78 to 2.81 percent. A recently published analysis of fire clay from Renovo, Pa., shows TiO_2 4.26 to 7.69 percent. Mr. C. B. Murray, chemist at the Braddock works of the Carnegie Steel Co., has written me that "in many fire clays titanium to a very appreciable amount exists. We at one time used a firestone (quartzitic rock) for patching our converters, containing 7 percent titanium. We found on analyzing our converter slag 2 to 3 percent of titanium, which for some time puzzled me to account for, but I finally located it in the lining of the vessel."

Titanium in Magnetic Ores.

It is in its association with magnetic iron ore that titanium in the form of titanic acid is found in the most notable pertitanic acid before mentioned. Hematite ores so rarely concentages, excepting, of course, the crystalline forms of pure tain titanium in even appreciable percentages that this element is seldom sought in analyzing this variety of iron ore. Notable analyses of hematite containing a high percentage of TiO_2 are from the Haycock mine, near Ottawa, Can. The ore is specular, occurring in gneiss. Three analyses gave respectively 3.17, 2.34 and 2.12 percent TiO_2. The magnetic titaniferous ores almost invariably carry a low and sometimes a very low percentage of phosphorus. It is probably due to this small percentage of phosphorus that such excellent iron, attributed to titanium, is produced sometimes. High phosphorus titaniferous magnetite ores are reported to have the following analyses:

	TiO_2	Phos.
South Crosby, Canada.....	9.8 %	1.52 %
Ekersund	34.50	.553
Norway	7.10	.336
Lincoln Pond, N. Y.....	12.31	.360
Adirondacks	....	.412

Other high phosphorus ores are reported. That magnetite iron ores should often contain titanic acid while nearly all hematite ores are practically free from it is explained by the geological occurrence of the titaniferous magnetic ores. They quite invariably are found in association with volcanic rocks, gabbros, diorites, serpentines. In Bulletin 6 of the Minnesota Geological Survey it is stated: "There is no iron ore in Minnesota which is known to exist in larger amounts than that of the gabbro-titanic iron groups. The rock is itself a gabbro, a basic eruptive of gray color, and generally of coarse crystalline texture." In Wyoming a great mass of titaniferous magnetite occurs as a dyke in granite; gabbro is found near it.

The occurrence of titaniferous magnetites in Rhode Island, Connecticut, New Jersey, West Virginia, North Carolina, Colorado, California, also in Sweden and Norway, is invariably in association with eruptive rocks. So it may be stated as fairly probable that quite all titaniferous magnetites are found in association with eruptive rocks. The presence of titanic acid in many magnetic ores is thus most likely due to their intimate association with eruptive rocks which quite invariably contain a notable percentage of titanic acid.

Titaniferous iron ores contain variable percentages of titanic acid. Some ores have as much as 50 percent, others have less than 1 percent; but they all impart the opprobrious name "titanic" or "titaniferous" to an iron ore, because the presence of even a small percentage of titanic acid in an iron ore is considered by many to affect injuriously the economy and ease of smelting it.

Elimination of Titanium.

Since the presence of a moderate percentage of titanic acid in an iron ore is so objectionable, many efforts have been made to eliminate it from the ore, while other efforts have been made to overcome the injurious effects of the excess of titanic acid in smelting by a proper fluxing to produce a liquid slag. The efforts to remove the titanic acid by physical concentration have been along the line of magnetic separation, since investigation of the problem made it evident that a titaniferous ore was in the nature of a mechanical mixture of magnetite quite free from titanic acid and more or less impure ilmenite containing sometimes as much as 57.71 percent of titanic acid. Ilmenite is only slightly magnetic; hence magnetic removal of the magnetite is in a measure possible. That that can be no successful concentration of the magnetite from a titaniferous ore by gravitational methods is manifest from the fact that the specific gravities of ilmenite and magnetite closely agree. The specific gravity of the former is 4.5 to 5.0 and of the latter 4.9 to 5.2.

The so-called iron sands occurring in large quantities along the lower St. Lawrence river and shores of the St. Lawrence gulf were subjected to concentration experiments as long ago as 1865. These experiments were reported in the Geological Survey of Canada, 1866-1869. The iron sands thus treated were from Moisie, Betsiamits and Mingan, province of Quebec.

	Moisie.			Betsiamits.		Mingan.	
	1	2	3	4	5	6	7
Protoxide of iron	70.10%		56.38%	92.44%	24.66%	86.92%	46.31%
Peroxide of iron.		92.68%			22.24%		
Titanic acid.....	16.00%	4.15%	28.95%	3.40%	26.95%	6.50%	31.60%
Oxide of manganese		.40%	1.10%		1.10%	.52%	1.35%
Lime		.90%	.95%		1.12%	.75%	1.05%
Magnesia					.72%	.70%	.50%
Insoluble	5.92%	1.95%	8.75%	3.85%	23.80%	4.20%	15.50%
Metallic iron....	53.25%	66.73%	43.85%	66.56%	34.94%	65.58%	36.00%

1. Natural sand. 2, Magnetic portion. 3, Non-magnetic portion. 4, Magnetic portion. 5, Non-magnetic portion. 6, Magnetic portion. 7, Non-magnetic portion.

*Extracts from a paper read before the Lake Superior Mining Institute, Aug. 17, 1904. Dr. Hulst is vice president of the Oliver Iron Mining Co.

In the foregoing results it is apparent that titanic acid in the form of ilmenite is mechanically mixed with magnetite and can be partly separated from it. As will be noted the crude sand contained 16 percent of titanic acid in No. 1 sample and the magnetically separated magnetic ore contained only 4.15 percent of titanic acid while the non-magnetic portion eliminated contained only 28.95 percent of titanic acid. In the other samples cited the separation of ilmenite from the magnetite was equally noticeable. However, the percentage of iron in ilmenite is so considerable that in concentrating a titaniferous ore carrying much titanic acid, there would be a loss of too large an amount of iron in the rejected non-magnetic portion to make this method of concentration commercially successful.

The results of several experiments in magnetic concentration made by Mr. J. Walter Wells, of the Kingston, Ont., School of Mines are reported by Mr. Obalski, in his report for the year 1902. They are as follows:

NO. 1 BEACH SAND FROM NATASHQUAN ST. LAWRENCE RIVER.

	Crude Sand.	Heads.	Tails.
Weight	26 oz.	3 oz.	23 oz.
Iron	17.97 percent	62.97 percent	8.08 percent
Phosphorus	.035 percent	.02 percent	.09 percent
Sulphur	.031 percent	.014 percent	.043 percent
Titanic acid	0.94 percent	3.74 percent	5.58 percent

NO. 2 BEACH SAND FROM NATASHQUAN, RICH IN IRON.

	Rich Bead Sand.	Heads.	Tails.
Weight	7 oz.	2 oz.	4 oz.
Iron	59.89 percent	70.07 percent	49.03 percent
Sulphur	.028 percent	.014 percent	.09 percent
Phosphorus	.041 percent	.026 percent	.086 percent
Titanic acid	11.91 percent	2.07 percent	24.02 percent

These experiments afford evidence that the titanic acid present is due to a mechanical or physical mixture of a titaniferous material with magnetite more or less free from titanic acid. The magnetic ore sands are, however, so fine, that the ore concentrated from them would have to be briquetted to make them suitable for smelting. An experiment was made by the late Mr. H. B. C. Nitze on a North Carolina titaniferous ore to eliminate the titanic acid by magnetic separation of the magnetite. His figures are as follows:

	Crude Ore.	Heads Separated by Magnet.	Tails.
Iron	41.95 percent	67.60 percent	21.63 percent
TiO2	15.35 percent	1.27 percent	26.80 percent
Silica	12.75 percent	1.30 percent	16.20 percent

The degree of concentration was not given. It is presumed the titaniferous magnetite treated was of a granular structure, as he states in his article "Iron ores of North Carolina" 1893, that the titaniferous magnetites in Rockingham, Guilford and Davidson counties are granular, containing an average less than 14 percent titanic acid. It is quite probable that only the granular titaniferous magnetites, in distinction from the dense close grained titaniferous magnetites allow any reasonable separation of titanic acid by magnetic concentration of the magnetite.

In an instructive resume of magnetic concentration of ores by Mr. L. Walter Wells, published in the "Report of the Bureau of Mines, Ontario, 1903," he cites experiments of F. J. Pope, formerly demonstrator of the Kingston School of Mines. In these Mr. Pope failed to get a separation of titanic acid from Eagle Lake ore, Frontenac county, Ont., by magnetic concentration. His experiments with ore from Pine Lake mine, Victoria county, increased the metallic iron from 43.38 percent to 56.45 percent, but at the same time the heads or concentrates of richer iron contained 18.10 percent of titanic acid, while the crude ore contained only 13.5 percent of titanic acid.

The foregoing experiments go to prove that from some ores a considerable portion of the titanic acid can be eliminated by magnetic concentration, always, however, with a large loss of iron. But such concentration to be in any measure successful mechanically, necessitates very fine crushing of the ore. Subsequent briquetting would be required to make the concentrates suitable for smelting. These conditions involve an expense which would make such ore production unprofitable. Therefore, although titaniferous ores in great volume are found in all parts of the world, where basic igneous rocks occur, there is an insignificantly small, perhaps it would be better to say significantly small, utilization of them. And the titaniferous ores that are consumed are those which contain very small percentages of titanic acid. More of such titaniferous ore is mined in New Jersey than anywhere else. So far as I know there is no mechanical or magnetic concentration of titaniferous ores to eliminate titanic acid going on anywhere. In Sweden where one-third of the ore the country contains is said to be titaniferous, and where more titaniferous ore of high percentage has been mined than elsewhere in the world, the mining of such ore came to an end in 1902, after more than a century of production. Effort was made at the Taberg mine long ago to remove the titanic acid by concentration. The concentration was accomplished by mechanical washing of the ore, but on account of the intimate mixture of the different minerals in the ore the effort only succeeded in enriching the concentrates by a few percent of iron. It was therefore not a commercial success.

Reduction of Titaniferous Ores.

Iron was made in Sweden from the titaniferous ore of the Taberg mine, centuries ago and its production from this source continued until quite recently. There are, however, no statistics regarding this mine before the beginning of the sixteenth century acording to the "History of the Swedish Mines and Their Development," (Carlberg, 1879). The average analysis of the Taberg ore is as follows: Iron, 31.450 percent; silica, 21.250 percent; phosphorus, .055 percent; titanic acid, 6.300 percent; alumina, 5.550 percent; lime, 1.650 percent; magnesia, 18.300 percent; sulphur, .013 percent; copper, .020 percent; volatile, 2.600 percent. Swedish furnacemen have had various titaniferous magnetites for furnace supply. They have contained titanic acid running from 4 to 22 percent or more while the iron percentage generally ran from about 30 to 50 percent. The fuel consumption in the reduction of these Swedish ores has always been very large. In the earlier days from 575 to 795 bushels of charcoal were required to produce one ton of pig iron, in their low furnaces. In 1855 larger furnaces were built and the fuel consumption was reduced thereby to 270 bushels of charcoal to the ton of iron.

The fuel consumption in smelting the easily reducible non-titanic ores of the United States is not quite one-third of the lowest Swedish fuel consumption in smelting titaniferous ores. A significant proof that titaniferous ores have ceased to have value there, is in the diminished annual production of these ores. In 1875 the Taberg mine produced 9204 tons, since which time the annual output has speedily diminished. The production for the year 1892 was 41 tons.

Titaniferous iron ore containing 38 to 40 percent titanic acid and 35 to 36 percent iron was smelted to some extent in England in 1868. W. M. Bowron, chemist at the furnace wrote of the features of the smelting, which appeared under his name in the transactions of the American Institute of Mining Engineers, Vol. XI. He says: "My experience with titanic acid in the furnace began in England 14 years ago, i. e., 1868, with my being employed as chemist by the manager of the Norwegian Titanic Iron Co., which was at the time smelting without mixture ilmenite from Norway in a furnace 16 x 50 feet. The process regarded as a process was a perfect success, but the enormous quantity of fuel required, the small quantity of iron in the ore and the cost and uncertainty of importation militated seriously against its commercial success and a few years saw the attempt abandoned." In this paper Prof. David Forbes's article on the subject in the *Chemical News*, Dec. 11, 1868, is quoted in part, by Mr. Bowron, as follows: "The experience of the Scandinavian iron masters has shown that the only objection to the use of titaniferous ores is that they are found to be more and more refractory in the furnace in proportion as they contain a large proportion of titanic acid. And if much titanium is present they require so much larger an amount of charcoal to smelt them as to render their employment not profitable in a country where other ores free from titanium can be obtained at a reasonable rate."

Bowron in commenting on Prof. Forbes's experience in smelting titanic ores, as given in the article cited from the *Chemical News* mentioned, says: "His experience in fluxing is what might have been expected, as perofskite, the mineral titanate of lime found in nature is practically infusible, while the mineral titanite the silico-titanate of lime is fairly fusible. A study of minerals seems to point to the fact that those that contain titanic acid and magnesia together in quantity are usually refractory and infusible. In smelting, the iron

will be white or at least mottled if there is much titanic acid to contend with. Titanic iron is essentially a forge iron. Foundry iron can only be produced when the titanium in the ore is low, and then only by making a large quantity of cinder so as to wash the titanic acid out of the furnace. This, of course, is at the expense of fuel and the tendency to obstruct the hearth is intensified. If then the use of titaniferous ores involves extra fuel, low heats and slow driving, and makes white iron, what is the inducement to use them? I can only answer that for ordinary use they are wholly unsuitable, but for making forge iron that has brought double the market price of common iron, for use as a mixture to impart the property of cold toughness, to other iron, or for making an iron to be mixed with other irons that are not quite up to requirements, for boiler plates, for blooms or for an extra good iron generally, these ores are most valuable."

We gather from the foregoing that Mr. Bowron could only see it profitable to smelt titaniferous ore to produce a pig iron suitable for forge iron, the quality of which gave it almost double the market value of common iron. Mr. Bowron's article appeared in 1882, when forge iron commanded a price far above that of today. Its market value today is hardly 50 percent of what it was in 1882. It would seem, therefore, that by Mr. Bowron's own estimate it would not today be profitable to make forge or foundry irons from ores carrying a moderate percentage of titanic acid.

Respecting the smelting of some of the New Jersey titaniferous ores, a friend has kindly furnished me with recent expressions of several furnacemen as to the use of titaniferous ores. They are as follows: "Some ores from Jersey contain half of 1 percent of titanium. I have successfully used three quarters in an ore mixture.

"Briefly I might say that the main objection to titanium is its behavior in the furnace. It seems to gradually build on the hearth and lower portion of the furnace walls until eventually the crucible becomes completely choked and the result is a chill.

"The building up of the hearth (with titanic compounds) is not usually from the bottom but the sides. This building up often gets above the tuyeres, reducing the diameter of the hearth and bosh. When it gets loose and slides down great trouble is experienced on account of the chilling effects in the furnace. Some claim that the use of additional lime will overcome this difficulty, but it leads to one which is perhaps as bad or worse in the shape of a lime scaffold.

"Nearly all the New Jersey ores have titanium in them. The amount varies. Hibernia ore contains about 1 percent of titanic acid. There is no additional expense incurred by the use of titaniferous ores except as they may cause bad working of the furnace. Titanium is not desirable in forge irons, since it produces red shortness, owing probably to the formation of infusible slags. Small percentages of titanium do not affect the working of the blast furnace, but managers of blast furnaces generally shy at iron ore high in the element.

"The titanic acid accumulates in the crucible of the furnace and also upon the bosh walls, and unless it is removed, in a short time it clogs the furnace to such an extent that it practically puts a stop to the operation. The method of handling titaniferous ore in a blast furnace is to make a large volume of slag. This slag washes the titanic acid out mechanically. A large volume of slag means a low yield of iron for a furnace, and also a large fuel consumption, so that the use of titaniferous ores is dependent upon the cost of fuel and upon the ore being furnished at a very much lower price per unit of iron than is the case with ores that are free from titanium. The quality of the iron made using titaniferous ores is said to be most excellent, especially if the ore is used for conversion into wrought iron. It is not adapted to foundry work where soft iron is required; that is, iron that can be run into castings of small sections, and at the same time to be drilled, or machined, but for heavy castings, requiring great strength like gun castings and heavy machine castings, it is said to have superior qualities. I have used small percentages of Jersey ores, containing up to possibly 1 percent of titaniam, but I have never used a mixture when the percentage of titanium in the total mixture would average anywhere near 1 percent."

In the transactions of the American Institute of Mining Engineers, 1892, R. W. Raymond says: "I need hardly say as to the difficulty of using titaniferous ores in the blast furnace, that it lies in the relative infusibility of the slag, into which nearly all of the titanic acid passes. We have made at Durham furnace foundry pig of excellent quality from mixtures containing only 1-16 of the Church ore (this ore has an average of close to 16 percent titanic acid), say 1 percent of titanic acid in the ore mixture; and we have had to pull the slag out with tongs, as it were, because it was so thick and sluggish. At the same time the hearth would fill up."

The consensus of opinion, in the just quoted experiences with the use of New Jersey ores containing so small a percentage of titanic acid as 1 percent in a furnace ore mixture, would tend to discourage one against using ores furnishing a greater percentage of it to the ore burden. Adding to such discouragement is the knowledge of the idle Taberg furnaces and the idle Taberg mine in Sweden furnishing ore containing 6 percent titanic acid, the long abandoned furnaces in the Adirondacks using ores fairly rich in titanic acid, the dismantled furnaces in Canada which smelted similar ores, the experience of the Norton-on-Tyne furnace smelting the Norway ilmenite containing 40 percent titanic acid. While all these enterprises bear eloquent proof that titaniferous ores can be smelted successfully judged from the metallurgical standpoint, the fact that they have all ceased a commercial existence seems fair evidence that they ceased to be successful commercially, if they ever were reasonably profitable undertakings. Whether, however, these have been economic failures largely on account of the low percentage of iron and the changes in the trade, incidental to the concentration of the industry and the growth of the steel industry, rather than to the presence of titanic acid in the ore is a question.

Experiments of A. J. Rossi.

But with all the records of economic failure in the use of the richer titaniferous ores confronting him, Mr. A. J. Rossi, has come forth as the champion for their use. He has written at considerable length on the subject of smelting them. His papers are found in the transactions of the American Institute of Mining Engineers, of the American Society of Mechanical Engineers, in the *Iron Age* of February, 1896, *Journal of the Franklin Institute*, 1902. His smelting experiments were conducted in a small open-topped furnace, of three tons daily capacity, burdened first with Lake Superior hematite ores, then with mixed Lake Superior hematite and Adirondack titaniferous ores and again with the Adirondack titaniferous ores as the sole burden. His comparison in the summary of this smelting work is as follows:

Run No. 1, non-titaniferous hematite from Lake Superior:

Pig iron	1.00	
Stone	1.15	
Coke	2.15	Ores 62 percent iron.
Coke	2.20	Ores 56 percent iron.
Pig iron	1.00	
Stone	1.19	
Coke	2.20	Ores 62 percent iron.

Run No. 3, titaniferous ores from the Adirondacks:

Pig iron	1.00	
Stone	.95	
Coke	1.99	Ores 52 percent iron, 20 percent titanic acid.

The high fuel consumption, two tons or more to the ton of pig iron, he explains as due to the diminutive size of the furnace, its open top and temperature of blast not over 400 degrees Fahr.

In run No. 1, it would seem that 1.15 tons stone is excessive for an ore containing 62 percent and an average of 5 percent silicon, 8 percent alumina and 1.25 percent of lime and magnesia. Quoting his language:

"These furnace tests on a practical scale have demonstrated, we believe, that under the conditions in which they were conducted:

"1. In a furnace only 20 feet high, with blast at only 400 degrees Fahr. under average pressure of 16 to 18 ounces, titaniferous ores containing 20 percent of titanic acid and 52 to 53 percent of iron, can be perfectly reduced making iron faster and with a consumption of fuel (coke) not any greater, or even less per ton of metal than other ores free from titanium, with an economy as to quantity of fluxes used.

"2. The titaniferous ores did not build in; the lines of the furnace were found cut just as much as is the case with any other ores, non-titaniferous, after a limited run. No titaniferous deposits were observed.

"3. Slags very high in titanic acid, containing 30 to 35

percent of TiO_2 and but 15 percent of silica with alumina, lime and magnesia as bases, were found perfectly fusible under these conditions of low heat. They were fluid, running liquid 40 feet from the furnace on a snake-like course. Chemically they were soluble without residue in hydrochloric acid, physically they crystalized in a distinct manner.

"4. With richer ores containing less titanic acid with a greater temperature of the blast, at least 800 degrees Fahr., as it has been done, much more economical results might be legitimately expected.

"5. It is possible to form fluid and fusible compounds with titanic acid by the addition of the proper quantities and nature of fluxes, such as a dolomitic stone introducing magnesia. The latter, combined with alumnia and lime, will contribute to render the titano-silicate or titanate much more fluid and fusible; contrary to what has been often asserted as to the difficulty or impossibility of tapping slags containing a few percent of titanic acid (1 to 2 percent).

"6. There is nothing in the premises which could lead to suppose that a furnace could not be kept running under these conditions for an indefinite period."

It does not seem clear how his furnace run No. 2, wherein the furnace burden included ore of average of 56 percent iron (mixture of hematite 62 percent iron and titaniferous ore 52 percent iron) hence containing less titanic acid than run No. 3, is in accord with his claim No. 4 given above, No. 2 run required 10 percent more fuel than No. 3 run, yet it was a richer ore by 4 percent of iron and the titanic acid should have been reduced to nearly 10 percent, while No. 3 run was made with ore containing 20 percent of titanic acid.

I am not prepared to dispute the claim of success in fluxing satisfactorily and economically a considerable percentage of titanic acid in an iron ore, which Mr. Rossi makes so confidently. His experiments were with a small furnace, yet there is no reason to doubt that he can duplicate his work in a large furnace. While some of the metallurgists of the country support his views, it is significant that iron masters for over eight years after the full published record in detail, of his experiments and claimed success, have not encouraged him to the extent of having him repeat his work in one of their modern furnaces.

I can understand how it would tax the courage of the average furnacemen to risk his reputation by undertaking to repeat Mr. Rossi's work in fluxing when it had been bred in his bone that a very little titanic acid in an iron ore was very bad. It would be quite marvelous indeed for him to reconcile the fact that if a very little of it in a furnace mixture were bad, an abundance of it would be a blessing, and yet this is what has been demonstrated as respects phosphorus in the basic steel process.

A. O. Smith, of Milwaukee, has purchased from the Pope Mfg. Co. the plant of the Federal Mfg. Co. at Clinton and Park streets. Articles of incorporation of a $200,000 company have been filed at Madison, under the name of the A. O. Smith Co. to manufacture automobile parts. The plant was established by C. J. Smith & Sons a number of years ago, and A. O. Smith was then treasurer and general superintendent. In 1899 it was bought up by the American Bicycle Co., a consolidation of bicycle manufacturers. Last fall the plant went into the hands of the Pope Mfg. Co., which bought all of the interests of the consolidation. This season the manufacturer of bicycles was almost entirely suspended, and hereafter the plant will manufacture nothing but automobile parts. It makes a specialty of pressed steel frames. The officers are: President, A. O. Smith; treasurer, Charles G. Forster; secretary, A. F. Hase.

N. & C. Taylor Co., manufacturer of tin plate, reports all departments of its Philadelphia tin plate works in full operation, employing twenty-six tinning stacks. The present activity of the plant compares favorably with the conditions in prosperous times. This company makes a specialty of high grade roofing tin. No Bessemer steel is used in any of its brands of tin plate.

The Railroad Steel Spring Co., Chicago, has declared the usual quarterly dividend of 1¾ percent on preferred stock, payable Sept. 20.

CANADIAN PIG IRON STATISTICS.

The American Iron and Steel Association has received direct from the manufacturers the statistics of the production of pig iron in Canada in the first six months of 1904. The figures show a decrease as compared with either of the two halves of 1903, as will be seen by the following table, which gives the production by fuels, in gross tons, in half-yearly periods.

Fuel used—Gross tons.	First half of 1903.	Second half of 1903.	First half of 1904.
Coke	123,500	124,405	111,840
Charcoal	9,430	8,083	8,803
Total	132,930	132,488	120,643

The decrease in production in the first half of 1904 as compared with the first half of 1903 was 12,287 tons, or a little over 9 percent, and as compared with the second half of 1903 it was 11,845 tons, or a little less than 9 percent. Of the total production in the first half of 1904 35,291 tons were basic pig iron, against 69,325 tons in the first half of 1903 and 57,567 tons in the second half of that year. A small quantity of Bessemer pig iron was produced in the second half of 1903, but no Bessemer pig iron was made in the first half of 1904.

The unsold pig iron held by Canadian manufacturers on June 30, 1904, none of which was intended for their own consumption, amounted to 36,868 gross tons, as compared with 19,168 tons on Dec. 31, 1903, and 13,585 tons on June 30, 1903. Of the unsold stocks on June 30, 1904, a little less than 4,000 tons were made with charcoal, the remainder being coke iron.

On June 30, 1904, Canada had 15 completed blast furnaces, of which 6 were in blast and 9 were idle. Of this total 11 were equipped to use coke and 4 to use charcoal. In addition one coke furnace was being built on June 30, 1904, and one coke and one charcoal furnace were partly erected but work was suspended.

During the first half of 1904 the total number of furnaces in Canada actually in blast for the whole or a part of the period was 10, of which 7 used coke and 3 used charcoal. The number of furnaces idle during the whole period was 5, of which 4 used coke when last in blast and one used charcoal.

The Dominion Iron & Steel Co., Ltd., of Sidney, N. S., had 3 of its 4 furnaces running during the first six months of 1904, although all 4 were idle on June 30. It expected to blow in two of its idle furnaces on Aug. 15.

The Londonderry Iron & Mining Co., Ltd., of Londonderry, N. S., had one of its 2 furnaces in blast on June 30.

The Nova Scotia Steel & Coal Co., Ltd., of New Glasgow, N. S., operated its Ferrona furnace, at Ferrona, N. S., for 180 days during the first six months of 1904. The furnace was idle on June 30 and will not be blown in for some time. The new furnace which the company is erecting at Sydney Mines, Cape Breton county, N. S., will probably be completed soon. It will be known as the Sydney Mines furnace and will have an annual capacity of about 75,000 tons of foundry and basic pig iron.

The Canada Iron Furnace Co., Ltd., operated its charcoal furnace at Radnor Forges, P. O., Quebec, for 143 days during the first half of 1904. Its Midland furnace, at Midland, Ont., which uses coke for fuel, ran for 142 days. Both furnaces were running on June 30.

John McDougall & Co., of Montreal, had one of their 2 charcoal furnaces at Drummondville, Que., in operation during the whole of the first half of 1904. The idle furnace was blown in on July 1.

The Hamilton Steel & Iron Co., Ltd., of Hamilton, Can., operated its coke furnace for 151 days during the first half of 1904 and was running it on June 30.

The Deseronto Iron Co., Ltd., of Deseronto, Ont., operated its charcoal furnace during the whole of the first half of 1904. —[Bulletin of the American Iron and Steel Association.

The Reading Railroad Co. last week inaugurated the plan of working its shops at Reading only five days a week. The shops had been working five and a half days, closing at noon Saturday.

Van Farquarson and William Bowen, of Warren, O., have leased a building in that city and will install machinery for the manufacture of sheet iron barrels, tanks, light plate and iron work.

NEW BOOKS.

"A Clean Chimney" is the title of a useful little treatise on the efficient burning of coal. The book has been prepared by A. Bement, a mechanical engineer who has devoted close attention to steam boiler possibilities and design, and is published for private circulation by the Peabody Coal Co., of Chicago. The introduction points out the tendency to accept the coal problem as a simple one not requiring either special skill or intelligence. The opposite is, however, true in the production of an efficient fire. "The general disposition is to consider that economical performance is an inherent characteristic of the apparatus itself, overlooking the fact that the relative value of different boilers and furnaces, is small, compared with their relative performance, due to proper or improper operation; and that the cause of smoke production lies in the manner of treatment rather than in the chemical characteristics of the coal." Taking this as a text, Mr. Bement has written five meaty chapters on heat efficiency, incomplete combustion, smoke and its prevention, washed coal and its preparation and the manipulation of fires and furnaces.

"Forge Practice" is the outgrowth of a series of notes given to the students at the Lewis Institute at Chicago, by the author John L. Bacon. The book, which contains 257 5 x 7½-inch pages, is of an elementary character and would seem to have excellent qualities for purposes of instruction in a technical school of the type named. Certainly in clearness of treatment it presents the manual work of the blacksmith with keen appreciation of the nice points of the craft. The writer is evidently an expert and has the happy faculty of describing shop operations with accuracy and zest. The reproductions from drawings made for the work are very neat; the draftsman has obtained definite results with a minimum of lines and in this respect the book is an example of line economy which does not in any way neglect all the essential informing qualities. The one illustration on page 182 is not nearly as successful as the rest. This is an attempt to show the phenomenon of recalescence in black and white but the action of the heated bar at this stage needs more elaborate means to do the situation justice. The chapters deal with a general description of forge equipment, welding, calculation of stock for bent shapes, steam hammer work, duplicate work, metallurgy of iron and steel, tool steel work, tool forging and tempering, calculation of stock and making of general forgings and other shop processes. A number of valuable tables are given and there is a good index. The book is published by John Wiley & Sons, of New York. Cloth bound, price $1.50.

The first volume of a series entitled "Types and Details of Bridge Construction," by Frank W. Skinner, associate editor of the *Engineering Record,* is a collection of examples of constructed wooden, combination, wrought iron and steel arches for highway and railroad purposes. The author proposes to present in the series an exhibit showing the development of advanced practice and its standard details, to illustrate the classes of structures adapted to different conditions, showing some of the characteristic differences between American and foreign designs as well as primitive or obsolete constructions. The series will record important and well-known examples so as to have their principal data easily accessible. The main consideration in preparing the data has been to clearly show in every case what has impressed the author as the special features and to give only what is essential to the design and present the chief requirements and methods involved in the construction and erection of the work. The selection of structures is not intended to be complete but is held to be sufficient to illustrate different types and show a wide range of practice in details. References are freely given to the source from which more extended data can be secured and in this way the book serves as an index to the stock of information available in technical journals, professional papers, etc. The references would not be expected to take the place of a bibliography of the subject by any means, but as opening avenues for additional light on the bridges here under examination will doubtless prove of much benefit, and in pruning away the non-essential features the author has brought his first volume into compact and easily handled form. The book nevertheless is not a small one and has 294 6x9-inch pages with many reproductions of photographs, blue prints, etc. The indebtedness of the writer is acknowledged to a number of bridge engineers associated with the construction of the bridges described, for the use of photographs and drawings. The chapters contained in the present volume treat of wood and iron arch spans, spandrel braced arches, arch trusses and plate girder arches. The author dedicates the book with a cordial tribute to the personality and professional skill of Axel Sahlin, a civil engineer well known to readers of *The Iron Trade Review* by his metallurgical achievements. The volume is cloth bound and is published by the McGraw Publishing Co., of New York. Price $3.

"The Industrial and Artistic Technology of Paint and Varnish" by Alvah H. Sabin will be found to have considerable information on protective coatings for metals, though the broad purpose of the book is of course to present a general outline of the subject of paints and varnishes with some account of their modern use and the principles involved in their fabrication and application. It is pointed out—and the assertion applies to other branches of industry—that many of the facts noted are practically unknown though old and some of them anticipate recently patented processes. The value of the information to the public is therefore sufficient excuse for their republication. One patent for the purpose of protecting the hulls of ships from corrosion given at page 292 does not come in the category of a revival of a valuable paint compound, and here as elsewhere the author writes interestingly and entertainingly of matters pertinent to paint and its proper use. He goes outside the ordinary limits of a treatise on paint when this digression is advisable to express an opinion on such subjects as electroplating, wood sheathing, attaching copper plates to the outside of steel ships and similar anti-corrosion expedients. In this and the subject of water pipe protection the author speaks not only as a practical chemist but his standing as a member of the American Society of Mechanical Engineers, the American Society for Testing Materials and other scientific organizations adds weight to his comments on the engineering side of this important subject. He does not content himself with the paint and its first application to the surface of the metal, but follows it to the final stages in the survival of the fittest. Here he is always attractive in style and allows himself at times a freedom of expression only capable of illustration by sample. Here is a part of the description of the manner in which asphaltum coated water pipe gets to its destination.

"Usually it is loaded on open railway cars, on which it is piled up, one section on the top of another, and the rivet heads dig holes in the coating; but sometimes this is in part prevented by laying old rope or other packing material between the pipes. The posts on the sides of the car scrape off some during transit; and when it arrives at the point of destination by rail the pipe is rolled off without very much ceremony; sometimes it rests on skids, sometimes on the ground. After it has been there a few days or weeks, during which time the boys pelt it with stones and hammer it with cudgels to hear the pleasing and resonant sound it emits, and play hide and seek in it, it is loaded on farm wagons and hauled over country roads and across fields, sometimes as far as fifteen miles, and dumped by the side of the ditch on the gravel and loose stones which have been excavated; then it is partly slid and partly lowered into the ditch. There one might suppose it '..sleeps well. Malice domestic, foreign levy, nothing can touch him further.' Not yet.

"The sides of the ditch are covered with fresh earth, poor walking in dry weather and banks of mud when it rains; but the pipe lying in the ditch makes a beautiful asphalt walk, and it is used as such not only by the curious rustic and the casual visitor but also by the entire gang of laborers going to and returning from work. Thus a large part of the coating on the outside of the top is removed; and if it is at all brittle, on cool mornings the vibration from people walking over it cracks it off from the inside of the upper segment. This kind of thing may be called the 'malice domestic.' Then comes the 'foreign levy' in the shape of a gang of tramp riveters to do the field riveting. They are all armed with sledges, hammers, crowbars and chisels; part of them work

inside the pipe and part on the outside. They wear hobnailed shoes; their sensibilities are not attuned to the highest pitch of refinement. The pipe had a good coating to start with if there is much left on it when they get through. And over all arches the clear blue sky, from which the July sun shines down, and its heat is reflected from the yellow sides of the ditch, and is absorbed by the black pipe until it is so hot that one cannot hold the hand on it, and if the coating is at all viscous it softens and slides off from the outside, and on the inside forms great tears and stalactite shapes. Then it rains and all the bare places, inside and out, get rusty. And the chief engineer objurgates and deplores, and when he wants sympathy has to look for it in the dictionary."

But the reader must not expect to find this breezy recital maintained throughout. There are pages of formal test records with numerous figures, formulæ and tables, some Greek and Latin, etc. It is eminently readable and should contribute to a better knowledge of a much used article which is too little understood by mechanics. The excellent illustrations deserve a special word of praise. The book is published by John Wiley & Sons, of New York. Cloth bound, 378 6 x 9-inch pages. Price, $3.

The Future of Lake Ship Building.

As illustrative of the condition of the lake industry the brief testimony of Mr. W. L. Brown, president of the American Ship Building Co., before the Merchant Marine Commission hearings in Chicago was especially illuminating. In referring to the great additions which have been made to the freight tonnage of the lakes during the past five years he stated that the total outlay in the shipbuilding industry of the lakes would approximate $125,000,000. Of this enormous amount of ship construction the American Ship Building Co. has turned out in the neighborhood of 90 per cent. New work just at present, however, is very slack, but Mr. Brown believes only temporarily so. He holds that the era of big steel ship construction and car ferry construction for lake service has only begun. Lake trade has reached the point where the small vessel represented by the wooden carrier cannot be operated at a profit. Steel ships of greater capacity must be built to supplant them, and Mr. Brown expects at the close of the Presidential campaign to see a number of large projects carried out which would involve the replacement of old tonnage by more modern bottoms. He also gave some most valuable data concerning the economy with which the modern carrier handles bulk freight on the lakes in conjunction with the improved facilities on the shipping and receiving docks. He attributed the excellent state of the industry on the great lakes to the protection afforded to it by the general Government through the coastwise laws. In fact Mr. Brown's testimony went to show that the shipbuilding industry of the great lakes is a thoroughly sound and excellent business and that it is bound to continue so for a great many years.—[Marine Review.

Crescent Manufacturing Co. and the Lackawanna Lubricating & Manufacturing Co., formerly of Connellsville, Pa., manufacturers of plumbers' brass goods and lubricators, are fully installed in their new plant at Scottdale, Pa., which is modern in structure and equipment. It gives greatly increased capacity, and new departments and lines of product are being added. D. B. Williams has severed his connections with both companies and the management is in the hands of A. W. Findlay.

The *Mining Magazine* is a new monthly publication of W. J. Johnston, 120 Liberty street, New York. It announces a strong staff of specialists and promises that the experience of its publisher in connection with the *Electrical World* and the *Engineering and Mining Journal* will be brought to the making of a periodical which will occupy an important place as a record and comment upon the progress and development of mining and metallurgy in English-speaking countries.

The Chilian Government has placed a large order for equipment with the Ingersoll-Sergeant Drill Co., including a large Corliss compound compressor and a full complement of Haeseler pneumatic tools for one of its largest shipyards.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

The Cypress City Foundry & Machine Shops, Plaquemine, La., have been incorporated with a capital of $10,000. Edward Miremont is president with the following board of directors: F. J. Robertson, Eugene Poche, Talbot Roth, J. Wade Landry, M. Pompaneaux and Sidney O. Labauve.

The Standard Grinding Machine Co., Augusta, Me., organized for the purpose of acquiring letters patent or licenses in the United States and foreign countries, covering grinding, crushing and other machinery, has an authorized capital of $600,000. The officers are: President, M. H. Simmons, of Augusta; treasurer, L. J. Coleman, of Gardiner.

The Abingdon Gate & Mfg. Co., Abingdon, Ill., has been incorporated with a capital of $1,500. The incorporators are: James A. Clements, J. E. Cox and B. P. Baird.

The North Star Iron Works, Hammond, Ind., have been incorporated with a capital of $10,000. The directors are: F. Dodge, R. T. Dodge, B. B. Potter and Myrtle Potter.

The American Lubricating & Machine Co., St. Louis, Mo., has been incorporated with a capital of $20,000, all paid. The incorporators are: Reese R. Jones, Thomas W. Jones, Joseph Morrison, Herrich J. Gray, Robert L. McLaren and John B. Chambers.

The Carleton Machine & Iron Co., Kansas City, Mo., has been incorporated with a capital of $10,000, all paid. The incorporators are: C. Carleton, L. H. Wilson, W. H. Gray and James G. Smart.

The Eastern Foundry & Machine Co., Richland, N. J., has been incorporated with a capital stock of $200,000, to carry on the business of mechanical and electrical engineers and toolmakers. The incorporators are: Frederick D. Hazelton, James Donald, Andrew Donald.

The South Missouri Iron & Smelting Co., St. Louis, has been incorporated with a capital of $1,000,000 The incorporators are: Charles Dollman, H. O. Engelke and E. P. Ewart.

The Ball-Bearing Wrench Co., Washington, D. C., has been incorporated with a capital of $30,000. The incorporators are: Charles B. Talbert, George W. Coldenstroth and Louis P. Keller.

The Union Iron Works, Jennings, La., have been incorporated with a capital stock of $5,000 to conduct a machine shop at the oil fields. The officers are: President, J. P. Smith; secretary, Benjamin Freeman; treasurer, E. L. Savoie.

The Bradfield Conveyor Co., Los Angeles, Cal., has been incorporated with a capital of $100,000, of which $49,000 has been subscribed. The directors are: M. Bradfield, J. M. Kellerman, C. M. Smith, W. B. Brown and H. S. Laughlin, all of Los Angeles.

Fires and Accidents:—

Fire recently destroyed the building and contents of the Syphers Machinery Co., Spokane, Wash., causing a loss of $10,000, on which the insurance amounted to $6,000.

The buildings of the Simplex Washing Machine Co., Davenport, Ia., were damaged by fire Aug. 25 to the extent of $12,000. The structures will be rebuilt.

New Construction:—

It is reported that the American Locomotive Co. will build additions which will greatly enlarge the capacity of the Montreal plant. The American company expects to do most of its exporting from the Montreal plant.

The Fitchburg File Co., Fitchburg, Mass., has just moved into its new shop. The main building is 350 x 40 feet, one story. The forging and annealing room, 60 x 40 feet, contains the latest and most approved machinery.

The Bridgeport Hardware Mfg. Co., Bridgeport, Conn., has begun the erection of a new building which will be 104 x 183 feet, two stories. The buildings will be made thoroughly fireproof. Another building, 75 x 50 feet, will be erected to be used for drop-forgings, hardening, tempering, etc. The company manufactures hardware specialties.

The Milliken Brothers' new steel plant being erected on the Staten Island shore, opposite Shooter Island, is progressing

rapidly toward completion. The pattern shop is completed and by early spring the entire plant will be in working order. About 800 men will be employed.

The new foundry of the Frank C. Patten Co., Sycamore, Ill., is nearing completion. The structure is 220 x 80 feet. A new pattern shop has also been built. The machine shop will occupy the present foundry when the new foundry is completed, and the space vacated by the machine shop will be used for the manufacture of gasoline engines, scales, etc.

The Lindsay Wire Weaving Co., Collinwood, O., will build an addition 40 x 180 feet, one story.

A site comprising 17 acres has been purchased by the Morse Iron Works, Erie, Pa., on which will be erected an extensive plant for the manufacture of malleable and cast iron fittings, and also plumbers' brass goods and supplies. Thomas G. Morse, who was formerly superintendent of the Jarecki Mfg. Co., Erie, is president of the new company. Those associated with Mr. Morse in the formation of the company are: James M. Sherwin, Robert G. Saltman, Edward Roach, C. M. Conrad, A. W. Walker, Frederick Koehler, William Spencer and Frank Payne.

While the structural work at the new mills of the National Tube Co., at Lorain, O., is completed, the mills are not nearly finished. A large amount of inside work is to be done in the way of installing machinery, and it will be several months before the plant is ready for operation.

Cain & O'Berry, boiler manufacturers, Orlando, Fla., will soon begin the erection of a new plant. The site originally selected proved objectionable to some residents and an injunction was granted prohibiting the erection of the plant at that point. Hence a new site was chosen.

The new plant of the United States Malleable Iron Co., Toledo, O., is about completed and it is expected that the plant will be in operation early in September. The main building is 400 feet long, with two wings. This is the main foundry room. The office is 40 x 70 feet, the pattern storage room 50 x 30 feet, and the power building 40 x 30 feet. The walls are all of concrete. The officers are: President, Robert C. Pew; vice president, Pressley T. Craig; secretary, W. H. Jeffrey; treasurer, D. C. Hagener.

Work has been begun on the new buildings of the Braden Mfg. Co., Terre Haute, Ind. Machinery has been ordered and will be ready for installation as soon as the plant is completed.

The Coburn Machine Co., Battle Creek, Mich., has been reorganized and will begin manufacturing upon a large scale. The capital is $60,000. A new plant will be erected.

The Tula Iron Works, Mexico, now have an output of about 2,500 tons of iron bars and castings. The Americans who recently leased the property intend to increase the capacity to about 20,000 tons. Ralph H. Beach, 44 Broad street, New York, and George Townsend, of Indianapolis, Ind., have a lease of the property for ten years with an option to purchase for $700,000 any time within that period. J. F. Jones, manager of the Phœnix Rolling Mills, Pittsburg, has been appointed general manager of the property. The new lessees expect to expend over $500,000 in improvements.

The Empire Iron & Steel Co., Niles, O., has just finished the erection of a new sheet mill which increases its capacity 25 percent. The new mill, whose erection was caused by the increased demand for the special products of this company in wrought iron and steel sheets, was placed in operation August 29.

Increase of plant equipment, new machinery and the building of an addition to the works of the Wisconsin Bridge & Iron Co., Milwaukee, will result from the increase of the company's capital stock from $100,000 to $300,000. An addition to the Menomonee Valley Works, 175 feet long, is under construction, and when completed will provide room for the new machinery which is to be installed.

Ranson & Smith, New York, have received a contract for the erection of one of the largest piano manufacturing plants in the world to be built at Despatch, a suburb of Rochester. The plant will cover 25 acres. The buildings will include a large foundry for the manufacture of piano plates.

Plans for an addition have been prepared for the Columbus Pneumatic Tool Co., Columbus, O. The building will cost about $10,000 and machinery about the same.

The Columbia Steel Co., Chicago Heights, Ill., recently incorporated, elected E T. Clarage, president; Frank Mattheissen, vice president; H. Peterson, secretary; and M. H. Kilgallen, treasurer. The company has selected a site and will soon begin the erection of a plant, plans for which are now being prepared by a Chicago architect. The main building will be 75 x 350 feet, another 50 x 350 feet, another 50 x 200 feet, and there will be several smaller buildings. The company will manufacture crucibles and high speed tool steel.

General Industrial Notes:—

The Troy Nickel Works, Troy, N. Y., which recently acquired property at Albany, will soon begin the manufacture of gas stoves. The buildings are now being prepared for the use of the new owner.

The Bridgeport Foundry & Machine Co., recently incorporated, has taken over the machine business of the Bridgeport Deoxidized Bronze & Metal Co. It has sufficient machinery at this time and will not be in the market. It will not build at present, but may enlarge its capacity at a later date.

The Hathorn Foundry & Machine Co., Mason City, Ia., has been sold to A. A. Koch, of Grinnell, Ia. Mr. Koch will continue the operation of the plant.

The Sligo Iron & Steel Co.'s mills, Connellsville, Pa., after a shut-down for two months resumed operations Aug. 25, giving employment to about 200 men. It is expected that the mills will be running in full force by Oct. 1.

The great works of the American Bridge Co., Ambridge, Pa., were placed in full operation last week, employing over 5,000 men.

Since the purchase of the Southern Car & Foundry Co.'s plant at Binghamton, near Memphis, by the American Car & Foundry Co., active preparations for beginning operations have been in progress. It is expected that a new start will be made within the next two or three weeks. When the plant was working in full force, it gave employment to between 600 and 700 men.

John W. Nolan, Thos. P. McMahon, T. C. Latimore, E. P. Nolan and others of Chattanooga, Tenn., have organized a foundry company with a capital of $5,000. They have leased the old Phœnix foundry building on Boyce street, and the building will be equipped with machinery of the latest design to carry on a general foundry business. The machinery has been ordered. John W. Nolan will manage the plant.

The first casting in the Hub City Iron Works, Aberdeen, S. D., was successfully made Aug. 21. This is the only foundry in the northern part of the State.

The Monongahela Iron & Steel Mfg. Co., Pittsburg, has signed the Amalgamated Association scale for its finishing department but refuses to sign the scale as drawn for the puddling. The finishing department is in operation, but no effort has yet been made to resume operations in the puddling department.

The Elwood, Ind., tin mills of the American Sheet & Tin Plate Co. are idle and no date has been set for their resumption. Eight of the Loughlin tin mills of that company at Martins Ferry, O., resumed operations this week.

The Old Meadow sheet plant of the American Sheet & Tin Plate Co., Scottdale, Pa., resumed operations this week after an extended idleness.

The Stewart Washer Co., Birmingham, Ala., Ernest Prochaska, engineer, has published a pamphlet devoted to the Stewart process of coal washing. The company designs and erects complete coal washing plants and the features of its method are illustrated in the pamphlet and described with considerable detail. The system is protected by patents issued to Ellwood A. Stewart in September, 1900. There are fewer elevators and a smaller consumption of timber in the construction than is common, the ordinary Stewart plant requiring only two elevators and two pieces of belting.

Late publications of the Michigan College of Mines, Houghton, Mich., are its year-book for 1903-1904 and a list of graduates, which shows that many are occupying important positions at Lake Superior mines or at the precious metal mines of the West. Of the board of control, five of the six members are directly connected with copper or iron mining operations in the Lake Superior region.